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A CWC/I PUBLICATION

80 micro

the magazine for TRS-80* users

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- Monte's Window

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What Better Way To Spend Your Summer?

PATCH WORK REVISITED
13 More Ways To Upgrade TRSDOS 1.3

MODEL 4 MAGIC
Run 2 Programs Simultaneously With LDOS 5.1

SOFTWARE RIOT!
Our Techies Pick Their Dream Libraries

NEW FEATURE:
Dave's MS-DOS Column

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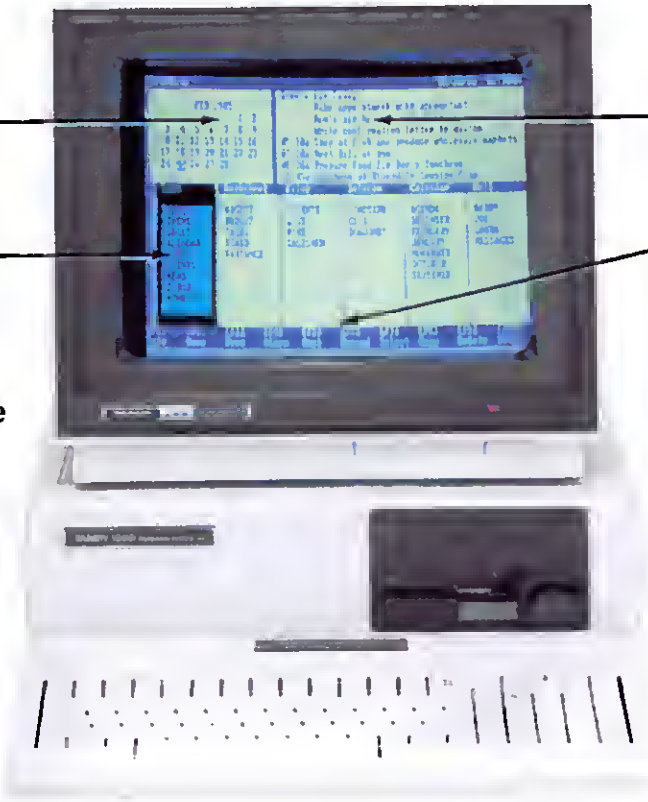

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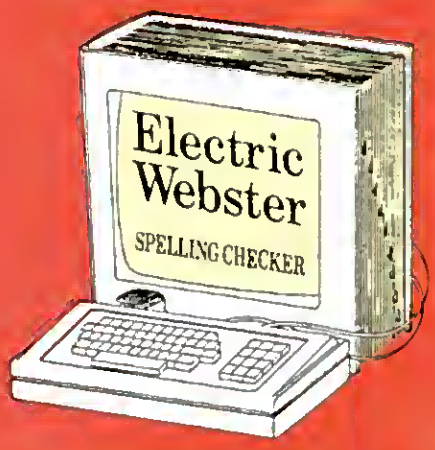

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SUPERCROSS XT

A program designed specifically for transferring data and program files freely between your own TRS-80 disks and those of many other computers. Eliminates the need for modems, terminal programs or access to a second computer. You can copy programs from 70 different DOS formats directly. Also FORMATS, displays DIRECTORY or KILLS files on alien disks, and can even copy "FOREIGN-TO-FOREIGN" in one step. Copies ASCII, Bit-Image, and Random Files back and forth.

MODELS 1/III/4 ..... **$ 94.50**
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LE SCRIPT

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JMG

GREAT PROGRAMS, GREAT PRICES AND FREE SHIPPING!!!

This month we have some new items in our line-up, such as the impressive PRONTO windowing systems from Misosys, which includes some very useful built-in applications that can be called up at any time. Also, we have the new BAS GW Convert program for converting IBM programs to Model 4, special formats of the Disk Drive Analyzer program, and new low prices on PowerDot and PowerMail. Plus, of course, our usual collection of top-quality software for the TRS-80 Models I, III and 4.

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Versatile "Electronic Notebook" that allows you to access stored information at the touch of a key, keeps notes, memoes, lists, or other information in instantly accessable "pages". SUPERLOG4 for the Model 4 also contains many advanced features and commands that will make you wonder how you ever lived without it.

LOG for Model I or III	$44.50
SUPERLOG for Mod I or III LDOS	$99.50
SUPERLOG4 for Model 4 (List $119.95)	$99.50

CONVERSION CORNER

BASIC 3 TO 4 CONVERT

Operates under Model 4 TRSDOS 6.x, CP/M, MSDOS (general), and MSDOS (2000). Converts Model III programs to run under these systems. Inserts spaces and translates commands where necessary. Please specify which version you want.

Basic 3 To 4 Convert (list $49.95) $39.50

BASIC 4 TO 3 CONVERT

Operates on Model I & III DOSes. Converts programs from Mode 4 Basic. Similar to Basic 3 To 4.

Basic 4 To 3 Convert (list $49.95) $39.50

BASIC GW CONVERT

A collection of programs and subroutines designed to translate IBM BASIC programs for use on TRS-80 Model 4! Will even convert high-res graphics if you have a high-res graphics board.

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We will beat any legitimate price advertised for any product that we carry. If you find a lower price advertised, our price will be $1.00 less, under the same conditions (eg. same shipping and other charges, etc). To receive the lower price you must mention the location of the other ad when ordering.

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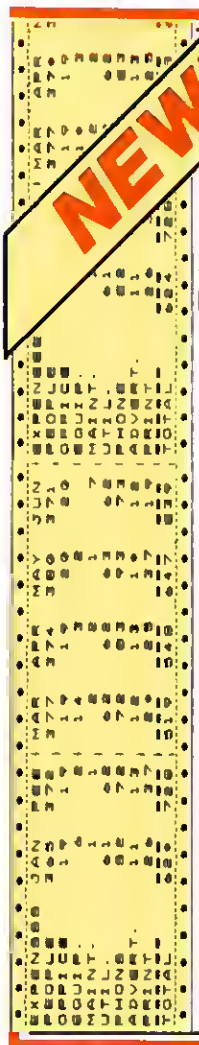

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LONGVIEW is easy to use and comes with ready-to-run setups. First, tell VisiCalc to print your spreadsheet to disk. Next, rotate the file with LONGVIEW. Then, print it with Dotwriter. That's all there is to it.

LONGVIEW $29.95

(does not include Dotwriter or VisiCalc)

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Each disk contains at least eleven fonts and supporting programs. The disks cost $59.95 each, and we offer substantial discounts to ALLWRITE owners. Please call or write to us for print samples, further information and pricing. Due to the specialized nature of this product, we recommend that you see the samples before ordering. Disk formats are available for TRS-80 I, III, 4, and MS-DOS. ALLWRITE is available only for TRS-80.

Information on these products is not available at our toll-free answering service, so please call or write to our Technical Support group for details:

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The left bracket, [, replaces the up arrow used by Radio Shack to indicate exponentiation on our printouts. When entering programs published in *80 Micro*, you should make this change.

80 formats its program listings to run 64-characters wide, the way they look on your video screen. This accounts for the occasional wrap-around you will notice in our program listings. Don't let it throw you, particularly when entering assembly listings.

Article submissions from our readers are welcomed and encouraged. Inquiries should be addressed to: Submissions Editor, 80 Pine Street, Peterborough, NH 03458. Include an SASE for a copy of "How to Write for *80 Micro*." Payment for accepted articles is made at a rate of approximately $50 per printed page; all rights are purchased.

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LOAD 80

Load 80 gathers together selected programs from this issue of *80 Micro* and puts them on a magnetic medium for your convenience. It is available on tape or disk, and runs on the Models I, III, and 4.

Load 80 programs are ready to run, and can save you hours of time typing in and debugging listings. Load 80 also gives you access to Assembly-language programs if you don't have an editor/assembler. And, it helps you build a substantial software library.

Using Load 80 is simple. If you own a tape system, load the Load 80 tape as per the instructions provided. If you own a Model I or III disk system, you boot the Load 80 disk and transfer the files to a TRSDOS system disk according to simple on-screen directions. If you own a Model 4, copy the Model 4 programs from the Load 80 disk to your TRSDOS 6.X disk using the COPY command.

Not all programs will run on your system. Some Model III programs, for instance, will run on the Model 4 in the Model III mode, but not in the Model 4 mode. You should check the system requirements box that accompanies the article to find out what system configuration individual programs require.

If you have any questions about the programs, call Keith Johnson at 603-924-9471. Yearly subscriptions to Load 80 are $199.97 for disk, or $99.97 for cassette. Individual loaders are available on disk for $21.47 or on cassette for $11.47, including postage. To place a subscription order, or to ask questions about your subscription, please call us toll free at 1-800-343-0728 between 9 a.m. and 5 p.m. Or, you can write to Load 80, 80 Pine St., Peterborough, NH 03458.

Directory

Menu, Clock

Article: Summer Romance (p. 38).
System: Model 4, 64K RAM.

Menu sequencing and clock display routines.

Language: Disk Basic.
Cassette filespecs: B, C.
Disk filespecs: MAINMENU/BAS, CLOCK/BAS.

Times2

Article: The Great Divide (p.62).
System: Model 4/4P, 128K RAM, LDOS 5.1, EDAS editor/assembler.

Run two programs simultaneously and swap back and forth between them.

Language: Assembly.
Cassette filespec: TIMES2/CMD (object code).
Disk filespecs: TIMES2/SRC (source code), TIMES2/CMD (object code).

Patch

Article: Patch Work II: The Sequel (p. 72).
System: Model III, 32K RAM, TRSDOS 1.3.

This Basic program creates a JCL file that installs up to 13 TRSDOS 1.3 patches.

Language: Disk Basic.
Cassette filespec: D.
Disk filespec: DOMAKER/BAS.

Pixel

Article: Upgraded Graphics (p. 76).
System: Model 4, 64K RAM.

Add the graphics commands Point, Set, and Reset to Model 4 Basic. Includes a demonstration program.

Language: Disk Basic.
Cassette filespecs: E, F.
Disk filespecs: PIXEL/BAS, PXLDEMO/BAS.

Window

Article: The Next Step (p. 98).
System: Model 4/4P, 128K RAM, ALDS editor/assembler.

Window system user interface; third in a three-part series.

Language: Assembly.
Cassette filespec: WU (object code).
Disk filespecs: WU/SRC (source code), WU/FLT (object code).

Bond

Article: Spreadsheet Beat (p. 108).
System: Model III, 48K RAM, VisiCalc.

Calculate bond yield to maturity for regular and zero-coupon bonds.

Disk filespec: BONDYTM/VC.

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Dion Owens/Kanner
PRODUCTION ASSISTANT
Janet Brown
AD/GRAPHICS PRODUCTION
Gary Ciocci

GRAPHIC SERVICES MANAGER
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Word Processors Don't Improve Writing

If you read the IBM PC magazines, you might have seen the Leading Edge Word Processor ad that features a picture of Abraham Lincoln and the opening lines to the Gettysburg Address. The point of the ad is never entirely clear, but along the way Leading Edge marvels at how "the great ones" were able to "record huge hunks of Truth" with nothing more than "primitive" scraps of paper.

"The amazing thing is that these monumental processors of words, did it without the benefit of monumental help," Leading Edge says with open-eyed wonder. That "monumental help" turns out to be (surprise!) Leading Edge's word processor.

Never mind that the ad includes several examples of incorrect punctuation, including the renegade comma in the sentence quoted above. You don't have to worry about such trifles when you're talking about huge hunks of Truth. I'm not as bothered by the sloppy writing as I am by the sloppy thinking, the notion that word processors somehow liberate creativity that heretofore could only be sucked laboriously from the well of imagination with a rusty old hand pump.

Personally, I don't find comfort in the thought of Lincoln using a word processor. I have an image of Abe on the eve of his Gettysburg appearance discussing matters with an aide:

Aide: Is your address done yet, sir?

Lincoln: Nah. I'll just bang it out on my 100 on the way there, and read it from the LCD.

Aide: But sir, we were hoping we could merge the file with our mailing list, and send out personalized copies to the press.

Once Lincoln did generate (as opposed to "write") the speech, he probably would have edited it to read something like "Eighty-seven years ago, our ancestors started this nation with the idea that everybody should be free and that we're all the same." How could he resist all those advanced editing capabilities?

The Leading Edge ad perpetuates the myth that word processors improve writing. Buy this software and you, too, can express yourself as Abe did. Well, that's not true. Good writing comes from the marriage of insight and articulation;

it's the ability to see the world with new eyes and share your vision with others. A word processor will not help. If you have nothing to say, all the software will do is let you say it with justified type and automatic footers.

In fact, I'll go one step further: Word processors can in some cases be counterproductive. They can break down healthy patterns, encourage sloppiness and lassitude, and turn the rough, unpredictable landscape of the mind into a suburb of seamless lawns and climate-controlled shopping malls.

I want to emphasize "in some cases." I won't argue that word processors are terrific for journalists, hack writers, white-collar workers, and secretaries, for whom time and volume is important.

I speak more for the craftspeople who recognize that while content precedes form, form can give shape, color, and texture to content, much as a climate stamps those who live in it.

This is why many writers are almost obsessive about the tools with which they work. The wrong size paper, a pen that feels funny, a different chair—they can stop a writer dead in his tracks.

I've noticed a change in my own writing over the last several years. Once upon a time, when all I used was a typewriter or notebook, I would spend days writing a piece in my head before I committed it to paper. When I finally sat down at my desk, I knew exactly what I wanted to say and how I wanted to say it. The result was usually quick, simple prose set down in a single draft.

As I've come to use a word processor almost exclusively, the discipline of that pattern has slowly dissipated. I find myself approaching a writing task with hardly an idea of what I'm going to say, and not much concern about it. Why should I worry? If I don't like how these little pixels are arranged, I can just turn them off and light up another string, until I find a combination that suits me.

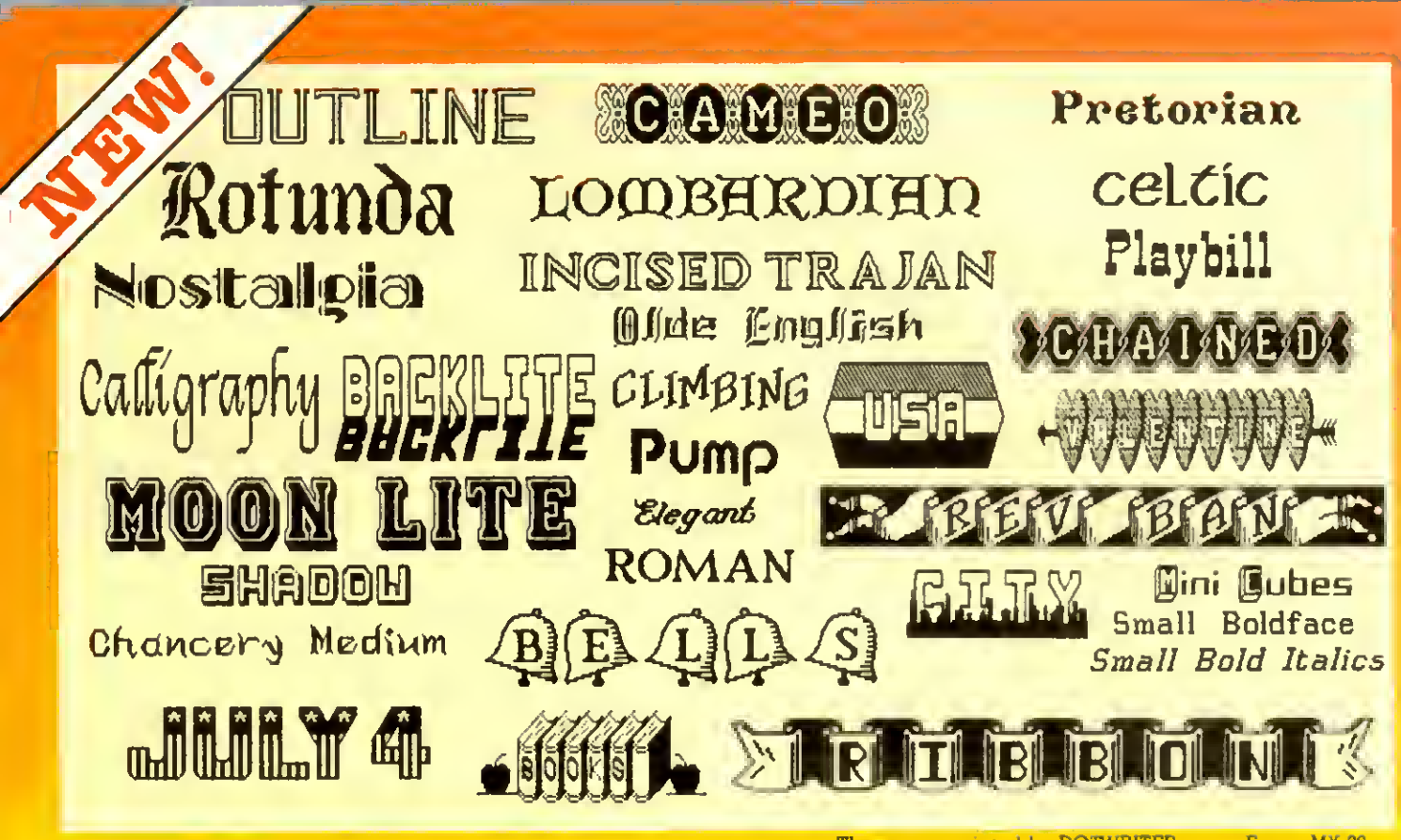
The result is often a partly conceived or vaguely expressed idea, an idea that I might have discarded if I'd first exercised it in my mind.

As I struggle to figure out what I'm going to say, I end up with a lot of time on my hands, time that invites excessive dawdling. So I occupy myself with the trivial tasks of writing—correcting typos, replacing words with ones that seem just a little bit better, inserting paragraph marks, and the like. I can make believe I'm working when in fact I've shut my brain off, like a would-be musician who spends all his time tuning his guitar instead of playing it.

Lingering over your writing has another unhealthy side effect—it encourages excessive polishing. I can spend so much time looking for the perfect word, the perfect phrasing, the perfect cadence that I drain the life from my prose; it's as smooth and hard as ice, but also as cold.

So what am I going to do about it? Alas, like so many others, I'm hooked on word processors like I'm hooked on electric lights and a car (I haven't surrendered my wood stove yet). I know the spiritual benefits of living closer to the primal technologies that nature bequeaths us, but am seduced by the material gains granted by the grosser technologies of modern life.

I have pledged, however, to return my Hermes 3000 manual typewriter to my desk at home. By day, I'll be a high-tech word-cruncher; by night, a sensualist indulging in the rich pleasures of the language. I'll do so having learned this lesson: No matter how efficient and productive a word processor can be, it will never inspire a thought, or capture a feeling, or express an idea. I'll have to handle those jobs myself. ■



Circle 91 on Reader Service card

These were printed by DOTWRITER on an Epson MX 80.

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★★★★★ 80 MICRO June, 1985

DOTWRITER lets you create spectacular, eye-catching letterheads, catalogs, invitations, or even books. It is just what you need to turn your dot-matrix printer into a versatile typesetting machine. And it's available for the Model 4 (yes, in native mode) as well as for the Models I and III.

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To use DOTWRITER, just write your text with any popular TRS-80 Word Processor, add the necessary formatting commands, and DOTWRITER will do the rest.

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If you want to create your own logos, modify our typefaces, or even design entirely new typefaces, then you will also want to order the "Letterset Design System" (LDS). We offer LDS at half-price when you order it along with DOTWRITER. LDS operates in Model III mode on the Model 4.

Versions are available for Epson MX-80 with Graftrax, MX-100 with Graftrax-Plus, RX-80, FX-80, C. ITOH 8510/1550, Microline 84/92/93; Radio Shack's DMP series 200–2100, CGP-220 & Gemini 10X, 15X. Please specify printer and computer!

Our print samples were done on an Epson. Sizes vary on other printers. Some of the samples shown here are taken from the additional Letterset disks.

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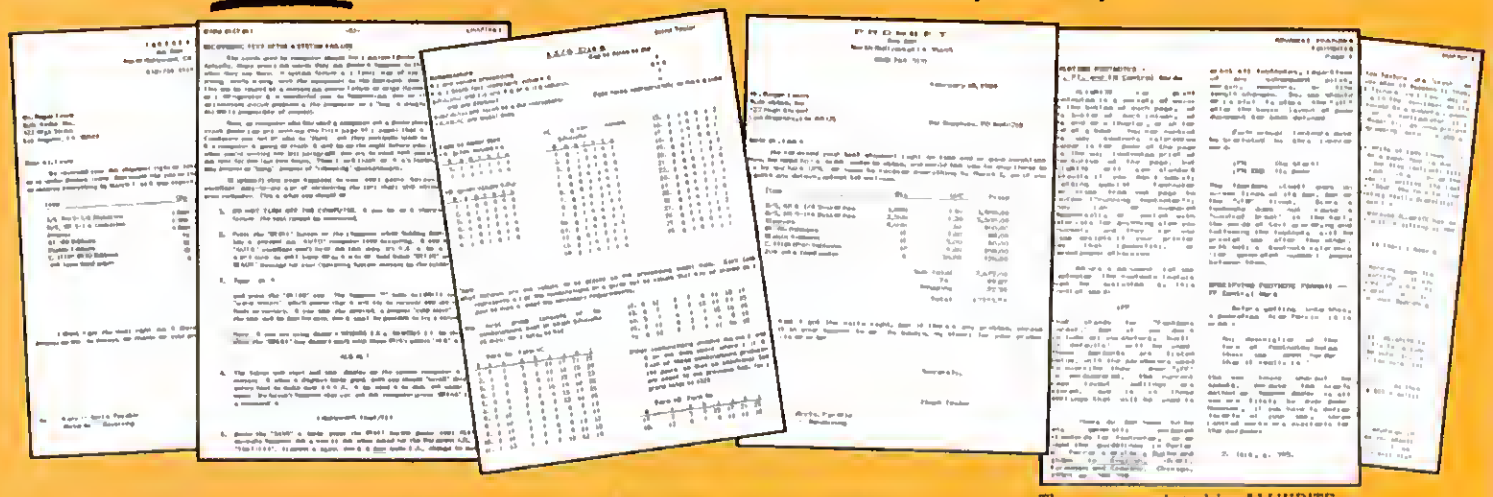

These were printed by ALLWRITE; shown 20% actual size.

We are proud to offer you the one Word Processor that will satisfy all your writing needs:* ALLWRITE. *It sets new standards for text editing and printing, and will give new life to your TRS-80. Let us tell you why...

In an attempt to push the public into expensive 16-bit computers, many manufacturers have been saying that the TRS-80 is obsolete. The truth is that the software, not the hardware, makes the difference. And the best word processor of all is now available *only* on the humble TRS-80, not on those expensive 16-bit machines!

ALLWRITE is based on the proven methods that made NEWSCRIPT the most popular independently produced TRS-80 word processor, but it also has the speed and new features our customers have asked us for. ALLWRITE will save you time and let you produce the highest-quality, most professional-looking letters, term papers, and reports available on a micro-computer.

Allwrite Can Save You Time!

Reads a 25,000 character file (10 printed pages) from disk in SIX SECONDS...does a global search-and-replace in FOUR SECONDS...outruns even the fastest popular micro-printer.

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You can set and change on-screen tabs and store them on disk. The print-time tabbing features are incredibly versatile: they allow left, right, and centered tabs, and even line up your decimal points.

ALLWRITE shows you where you forgot to turn off underlining, boldface, italics, or double-width. Special on-screen Preview feature shows page breaks and page layouts...including underlining and boldface ...without annoying blinking or screen flicker. In "Summary" mode, ALLWRITE quickly flags formatting errors without wasting time printing all the text. These standard features make document preparation faster and easier than ever!

State-Of-The-Art File Handling

There is no upper-limit on document size with ALLWRITE, because it chains files *backwards* as well as forwards, even across diskettes. Switch from one chained file to another in less than six seconds by pressing two keys. Select portions of other files for inclusion at print time...great for stock paragraphs.

ALLWRITE salvages text from bad disks! If a sector goes bad, you won't lose the entire file, because it will skip bad sectors, read the rest of the file,

TAKES FULL ADVANTAGE OF YOUR MODEL 4.

The model 4 version of ALLWRITE uses **the entire 80-by-24 screen.** On a 64K machine, you can edit **over 34,000 characters** of text. On a 128K machine, you can edit **THREE FILES AT THE SAME TIME!** The second and third files can be over 32,600 characters each, for a total of **almost 100,000 characters** of text in memory.

and then show you where the lost text belongs. This advanced error recovery turns a disaster into a feeling of profound relief.

User-Definable Soft Keys Reduce Typing Time

You can store 22 phrases or commands at a time into "soft-keys," then press just two keys to retrieve them. This makes frequently-used phrases and formatting controls a snap to use. You can store these definitions on disk and build a library of hundreds of preprogrammed keys to fit every one of your applications.

Our specially-designed templates fit right on your keyboard to let you see your settings at all times. Each template is also a Reference ("Cue") Card, so it is always right in front of you when you need it, without using up valuable screen space.

ALLWRITE Is Easy To Learn

ALLWRITE's commands and control keys are easy to remember because they use the first letters of common English words: 'CE' stands for 'Center,' 'Search' and 'Replace' do just that, and so forth. The on-line HELP menu offers over fifty screens of topics.

NEWSCRIPT's documentation was acclaimed in every review, and ALLWRITE's 350-page book is even better. Portions of it are designed for beginners, with every feature clearly explained in step-by-step tutorial style. Since you won't always be a beginner, other parts of the book offer advanced topics. There is a cross-reference summary chapter, a 14-page comprehensive index, and a detailed Table of Contents. We've been developing computer programs and manuals for over 20 years, and understand the importance of good documentation.

To make installation easy, we include Tiny DOSPLUS for the Models I and III, and special, pre-tailored versions of both TRSDOS 6.2 and DOSPLUS IV for the Model 4, all at no extra charge. The Model I and III versions work equally well with all major DOS's.

PROSOFT'S On-Going Customer Support

Perhaps the best reason of all for having ALLWRITE is the continuing support we offer you: friendly, expert, direct support that is unsurpassed in the micro-computer industry. There is no time limit to our support: if you are our customer and you need help, just call or write. We give free updates for 90 days, and charge little or nothing for minor updates thereafter.

Customer Comments

"This is the best software package I have ever received... superb, easy to use, fast, and has more features than the business word-processor at the office." *(E.R.L.)*

"ALLWRITE is a professional system that sets a new standard in word processing. It's powerful and easy to learn and use."

80 MICRO, Nov., 1984

"Your company and products have to be one of the strongest factors I can think of for keeping me with the TRS-80!" *(J.R.H.)*

"NEWSCRIPT is the Cadillac of word processors. ALLWRITE is the Mercedes Benz!!" *(B.E.)*

"...a very readable manual." *(D.S.)*

BENEFITS OF OWNING ★ ★ ALLWRITE ★ ★

If Word Processing is important to you, PROSOFT's ALLWRITE is the best choice you can make. The clean, professional appearance it adds to your letters and reports will make an excellent impression on people. We will be happy to send you free print samples so that you can see for yourself how good ALLWRITE will make you look.

You probably know that quality word processors for CP/M and the IBM-PC sell for $300–500, and they don't have ALLWRITE's capabilities or speed ... or PROSOFT's proven, on-going support. Now, for a fraction of the cost of a new computer, you can have the most complete word processor of all. And you won't have the headaches of starting all over again with a new, different computer.

Note to college students: with its Footnote, Table of Contents and Index features, ALLWRITE is ideal for your reports and Term papers.

HUNDREDS OF USEFUL CAPABILITIES

ALLWRITE comes with just about every useful word processing feature ... standard. Here are some highlights: excellent right-justified proportional printing on most printers having that ability; powerful Form Letter and Mailing Label preparation; Instant counts of words, characters, lines, changes; block Move, Copy, Delete, Puttile, Getfile, and List; delete by character, word, line, sentence, paragraph, or block; insert and one-key insert; great RS-232 printer support; accepts all 256 ASCII codes from keyboard; intermix pitches on same line (printer-dependent); 1.5 line spacing, 6, 7, 8, 12 lines per inch (printer-dependent); does multiple-columns on all printers; perfect alignment of hanging indents; variables, logic statements, conditional printing; wildcard Directories; integrated with Electric Webster and DOTWRITER for Models I, III, and 4 (these are sold separately); "Legal" line numbering; paragraph, list, and figure numbering; supports most popular printers (all "printer drivers" included); compatible with high-memory drivers; fully explains all DOS and ALLWRITE error messages; wildcard search-replace; tabs, search-replace, other settings remembered across files; word reversal; up to nine levels of boldface; flexible page titles; footnotes at bottom of page or end of document; Table of Contents and Index generation; and PROSOFT's unmatched text formatting and printing capabilities.

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Andy Chaktres
Ventura, CA

Readers can submit their templates to Spreadsheet Beat c/o 80 Micro, 80 Pine St., Peterborough, NH 03458. We pay $50 for each one we use.

—Eds.

Tax Relief

Your March issue contained the only comprehensive article I've found on home computer income tax deductions. "Reasonable Deductions" by Lake, Golden, and Lett is clear and concise, and the examples are excellent.

G.C. Stanberry, Jr.
Houston, TX

Let the Games Continue

I think you're making a big mistake in discontinuing your annual games issue. You say games are now on the bottom of your readers' want list. What about readers like me who looked forward to the games issue? Are we going to be left out in the cold? I used to think your magazine was great because you covered all areas of computing: business, games, hobby, and so forth. But now it seems you're focusing only on business.

Randy Landgraf
McMinnville, OR

We're not dropping games altogether; we'll continue to publish them from time to time.

—Eds.

Line Item

In the February 1985 Basic Takes (p. 108), Richard Ramella makes the misleading statement, "...lower line numbers save memory...." Actually, Basic stores a tokenized line with a 2-byte hexadecimal line number, regardless of that line number's size. It is only those relatively infrequent GOTO and GOSUB lines that store the following number in a multibyte ASCII format. Therefore, if a program doesn't contain any GOTO or GOSUB lines, renumbering will not save space. Also, newer GW-type Basics store even GOTO and GOSUB lines in a tokenized 2-byte format, so you can't reduce memory requirements due to renumbering.

Frank Vanslager
San Jose, CA

I appreciate Mr. Vanslager's correction. The Model 4 and Tandy 1000 Basics don't give the results I indicated. Readers can use a simple test to determine if their computer can conserve memory by renumbering Basic listings. Type in:

```
50000 GOTO 50010
50010 END
```

Run the program, then type in your computer's command for displaying available memory, either PRINT FRE(0) or PRINT MEM, and press the enter key. Write down the number that appears. Erase the listing and type in and run the following program:

```
1 GOTO 2
2 END
```

Once more, display available memory; if the first number is higher than the second, you can save memory by using lower line numbers.

If memory isn't a consideration, don't bother to renumber. But many users are still working with only 16K of memory. Sometimes they need, for example, to clear a few more bytes for strings, and this is a way to wrench that memory out of a long listing.

Richard Ramella
Chico, CA

80 Micro's BBS is open 24 hours a day. It offers programs you can up- and download, special-interest groups, and a classified section. You can reach the board at 603-924-6985; UART settings are 300/1200 baud, 7-bit words, 1 stop bit, and even parity.

Tandy Si

After reading the May 1985 Input page, I felt the desire to say a good word for Tandy and the Radio Shack people. Just over a year ago, I acquired a Model 4. I had never had my hands on any computer of any make or model. The Radio Shack staff struggled through my learning period with me, and I have nothing but praise for them. After all, why should a 74-year-old man be starting out to learn to operate a microcomputer?

Now I'm using a payroll package, Scripsit, VisiCalc, and General Ledger. As far as I'm concerned, the Model 4 is a good piece of hardware, and I have been pleased with the DWP-210 printer that I bought. Some day I may outgrow it.

R.T. Vaughn
Nashville, TN

CP/M No

You can find myriad applications programs that run under MS-DOS, TRS-DOS, and PC-DOS for business, education, math, communications, aviation, medicine, stamp collecting, and so on. Also, under those operating systems, which are easy to learn, remember, and use, you can develop and write programs in Basic, Pascal, C, Fortran, Cobol, Forth, and Assembly language.

So what is all this hype and hoopla about CP/M being now available for certain computers? Public domain programs? They lack documentation and are therefore of limited use. If computing is to go forward, we nonprofessionals need simpler systems, not expanded availability of a difficult-to-learn, complicated operating system like CP/M. One can hardly go forward by taking a backward step.

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Sparta, NJ

SPEECH

fun simple powerful

with the vs-100 voice synthesizer

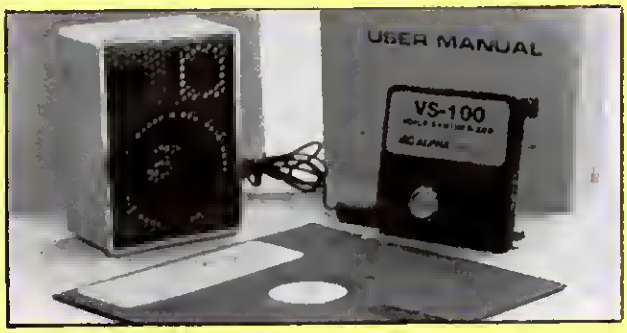
Check these features:

Talker 2.0 and Talker 4.0 software:

- ☑ Unlimited translation of English text to clear speech.
- ☑ Powerful video or keyboard echo can be switched on or off at any time.
- ☑ Can be used in BASIC with 2 new commands: PRINT* "I can talk" speaks any expression. PRINT! "Hello" speaks *and* prints on screen.
- ☑ Reads numbers up to 999 trillion.
- ☑ Speaks many abbreviations, such as Mrs., Mr., lb., oz., Co., etc.
- ☐ Walks the dog.
- ☑ Many control codes to tailor the system to your wishes. (Pitch, speed, etc.)
- ☑ Only 6¼K long.
- ☑ Talker relocates itself into available high memory. Compatible with any DOS (not CPM).

The VS-100 hardware:

- ☑ Same performance as very expensive units.
- ☑ Super efficient: About 50 bytes per sentence.
- ☑ Handsome speaker module included.
- ☑ Detailed 48 page manual.
- ☑ Ready to plug in and talk right away.
- ☑ Uses the famous Votrax SC-01 with 4 pitch levels and automatic inflection.
- ☑ Built in audio amplifier with volume control.



The VS-100 system. (Model I shown)

$69.95

Includes:
- VS-100 synthesizer
- Speaker
- Power supply
- Manual

Specify Model I, III, 4 or 4P.
Model 4P needs short 50 pin extension cable 14.95

See the detailed review in 80-Micro December 1984.

TEXT-TO-SPEECH SOFTWARE

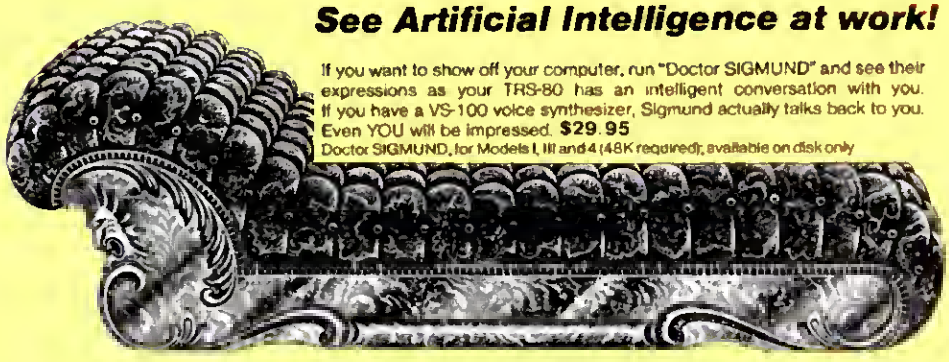
- **Talker 2.0** for Models I and III On disk only..... 29.95
- **Talker 4.0** for Model 4. Includes Talker 2.0 for Model III mode. On disk only..... 39.95
- Text-to-Speech for tape users 19.95

Small Print: ● Model I: unit plugs into keyboard or expansion interface 40 pin bus. ● Model III,4,4P: unit plugs into 50-pin I/O bus. Model III VS-100 works with Model III,4,4P. Use our "Y-cables" (see next page) if your bus is already used.

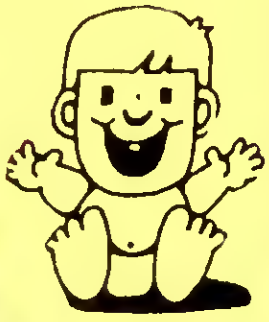
The VS-100: You've never had so much fun with your TRS-80

"Doctor SIGMUND" will amaze you!

See Artificial Intelligence at work!



If you want to show off your computer, run "Doctor SIGMUND" and see their expressions as your TRS-80 has an intelligent conversation with you. If you have a VS-100 voice synthesizer, Sigmund actually talks back to you. Even YOU will be impressed. **$29.95**
Doctor SIGMUND, for Models I, III and 4 (48K required); available on disk only



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Send your questions or problems dealing with any area of Tandy/Radio Shack microcomputing to Feedback Loop, 80 Micro, 80 Pine St., Peterborough, NH 03458.

Q • My students use cassette-based Scripsit modified to run at high baud rate. This speeds up operation and hasn't caused any problems with reliability. I use disk Scripsit 3.2 and would like to be able to load students' high-baud tapes or write to tapes they could use. What modification makes the program set the cassette recorder to high? *(K. Edward Renner, Dalhousie University, Halifax, NS)*

A • Here's a patch that modifies Scripsit 3.2 for high baud rate:

PATCH SCRIPSIT/CMD (ADD=5308,FIND=AF321142,CHG=AF320000)

And here's the same patch for readers using Scripsit 1.0:

PATCH SCRIPSIT/CMD (ADD=5222,FIND=AF321142,CHG=AF320000).

Q • I have a 128K Model 4P and a dual-drive 48K Model III with Radio Shack's double-density board. I have several questions about software and hardware.

First, I want to install Radio Shack's Scripsit Spelling Dictionary with SuperScripsit, but I'm missing the Install program. Can you describe how to install the dictionary?

Second, I've transferred Radio Shack's Haunted House from tape to disk, but the program comes in two parts. At the end of part 1, the message "Ready cassette-hit enter when ready" appears. I've located the message using Debug, and I want to change it to read "Loading second part-standby" and then call the second file and have it start execution. Although I appended part 2 to part 1, I'm unable to start executing the second part without going to DOS and typing in its filename. Any ideas?

My third question deals with Radio Shack's MicroChess program. I want to transfer it to disk but haven't succeeded, even with these utilities: COPY2/CMD, Tapedisk/CMD, Transfer/CMD, Whatzit/CMD, T2D2/CMD, Super Utility 2.2Z, and TRSDOS 2.7DD's Tape command. Can it be done?

Fourth, can I use my Model I disk drives and a four-connector disk drive cable to make my 4P a four-drive system? My Model I drive zero has a power supply that operates drives zero and 1; would I need any additional equipment?

Finally, I'm thinking about getting an Aerocomp 30-megabyte hard disk drive to use as my primary drive, but I'd like to format and run the following operating systems on it: TRSDOS 6.2, LDOS 5.1.4, and Montezuma CP/M 2.2. I have TRSDOS 6.2's and LDOS 5.1.4's hard disk initialization routines. Can you describe the procedure for partitioning the hard drive for these systems? Do I need Montezuma Micro's hard disk drive support package to do it? *(William Kirksey, Corpus Christi, TX)*

A • You're using SuperScripsit in Model III mode. Before you install the dictionary, back up your SuperScripsit and Scripsit Dictionary disks. You should have a Proofread disk; back it up, too. Boot up the SuperScripsit disk in drive zero; at TRSDOS Ready, remove the disk and put the Proofread disk in drive zero. Put the Dictionary disk in drive 1. Type in KILL SPEDIT:1 and KILL CHECK/CMD:1, then type in COPY PRDOF/CTL TO PRDOF/CTL:1. That's all the Install program does: Install the Proofread Control file on the dictionary disk after making some space for it.

As for Haunted House, I don't believe you can do what you want. The second part of Haunted House is supposed to run at a lower location in memory than where you have it. Moving it higher, as you've done, makes some of the machine-language jumps incorrect. You need to add a short machine-language program to the end of part 2 that moves it to its proper location, then jumps to part 2's execution address. And you need to modify part 1 so that it automatically jumps to this machine-language routine when part 1 finishes.

I don't know about MicroChess—does anyone know how to get it to disk?

About those extra drives. I've finally discovered why it's so hard to put external drives on the 4P: The pins for those two drives aren't even connected to anything on the controller board. The Q2 and Q3 outputs from the floppy disk controller chip are left unconnected. To add external drives, you must go into your computer and hard-wire the outputs from Q2 and Q3 to an inverter chip and then onto the staking pins that your drive cable uses. You also need a new drive cable. You can't use the old Model 1 cables because the 4P uses a double row of 34 staking pins on the drive controller board to connect to the disk drive cable instead of an edgecard connection.

To use the hard disk drive with Montezuma Micro's CP/M you will, of course, need their hard disk support package. The operating system manuals describe the procedure for partitioning the hard drive. Basically, you lie to the operating systems about how much memory is available on the hard drive and where each system is supposed to find its section. The operating systems won't be able to share sections. CP/M won't recognize TRSDOS's sector/platter partitioning and vice versa, so each system will have access to only a portion of the hard drive's surface.

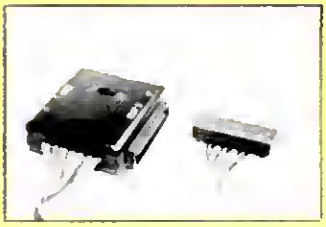
Q • My questions concern the Tandy 1000's TEAC disk drives. As configured, they use the TEAC 54B double-density, 40-track, nine-sectors-per-track format. I recently bought two TEAC 55F quad-density 80-track drives and would like to install them in my Tandy 1000. TEAC gave me the following DIP (dual in-line package) shunt configuration: DS1, HM, IU, and SM on both drives, with drive A having the termination.

After trying this configuration and several other combinations, I still can't get my system to boot up. I receive either

Newclock-80 $69.95

The right time at the right price! Keep the time and date with quartz accuracy, even when your computer is off. The backup lithium battery (included) will last for over 2 years. Software on tape or disk, please specify. Use "TIMESET" once to set the clock. Use "SETCLK" to set your computer's internal clock (at power up) or use "TSTRING" so that the "TIME$" function reads the Newclock.
Connection: Model I: plugs into the keyboard or expansion interface. Model III: plugs into the 50-pin I/O bus. Compatible with all operating systems.

Printswitch $59.00

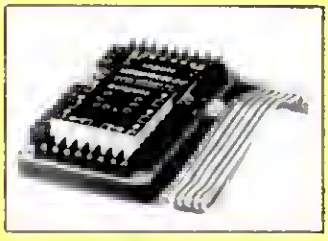


Do you have 2 printers? Get a Printswitch. Stop plugging and unplugging those printer cables. With the Printswitch, you can have 2 printers connected to your computer and you can select either one at the flick of a switch. Works with any printer, plotter, or device that uses the parallel printer port. Simply plug the 14 inch Printswitch cable into your computer, and plug your existing printer cables into the Printswitch. This is the nicest unit on the market. Superior quality board with gold plated edge connectors. For Models I,III, 4 and 4P.

Alpha Joystick $27.95

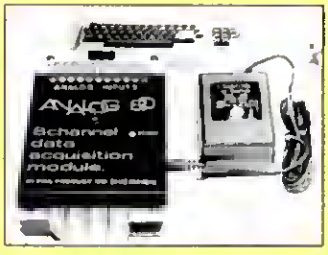
When it's time for fun, don't be without your Alpha Joystick. Do you know that most action games are Joystick compatible? Stop pounding on your keyboard and enjoy real arcade control. The joystick can also be used with BASIC programs; simply do J=INP(0) to read the joystick position (8 directions and fire button). Model I: plugs into keyboard or expansion interface. Model III, 4 and 4P: plugs into 50-pin I/O bus. The Alpha Joystick comes fully assembled and tested, ready to plug in and enjoy. (Specify Model I, or Model III,4).

Interfacer-80 $159.00



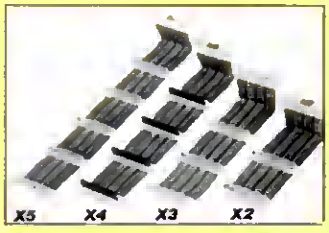
Low cost input and output device. The outputs consist of **8 relays** (rated 2 Amp @125V), easily controlled using "OUT" commands. For example, OUT 0,0 turns all the relays off. Eight LED's show the states of the relays. The **8 inputs** are optically isolated, so it's safe and easy to connect external devices (switches, sensors, thermostats, etc.). Simple "INP" commands read the inputs.
Connection: Mod I: 40 pin bus. Mod III, 4, 4P: requires 50-pin I/O bus converter ($39.95), plugs into 50-pin I/O bus. Comes complete with power supply, cable, and detailed manual.
(Up to 8 interfacers can be connected to your TRS-80 using our Y- cables).

Analog-80 $139.00



8 channel 8 bit Analog to Digital converter. Your TRS-80 can read voltages, temperatures, pressures, light levels, etc. • Input range: 0 to 5.1 Volts. • Resolution: 20mV. • Conversion time: 120 microseconds. In BASIC, you can take up to 100 readings per second. • Port address: selectable. Up to 8 Analog-80's can be connected to your TRS-80 for a total of 64 channels!
Connection: Model I: 40 pin I/O bus. Model III, 4, 4P: requires 50-pin bus adapter ($39.95). Comes complete with power supply, cable, and manual.

Special Cables



Disk drive extender cable (8")...C160:$9.95
Y-Cable for Mod I bus (40 pin): • **X2-40**...$29 • **X3-40**...$44 • **X4**...$59 • **X5**...$74
Y-Cable for Mod 3 & 4 bus (50-pin): • **X2-50**...$34 • **X3-50**...$49 • **X4-50**...$64
Disk drive cable (34 pin): • 2-drive...**C162**:$32 • 4-drive...**C163**:$45
Extension cable, 4 foot: • For printer and drive (34-pin)...**C165:**$22
• For Mod I bus (40-pin)...**C167:**$24 • For Mod 3 & 4 bus (50-pin)...**C169:**$28
Keyboard to E/I (40-pin, 8")...**C161:**$21 If this is confusing, send for our Cable Flyer.
Our cables are made with high quality gold plated connectors to ensure utmost reliability

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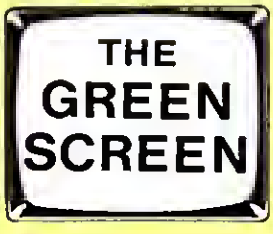
Green Screen $12.50



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a disk boot error message or a message to insert the disk. I've tried both MS-DOS 2.11 and PC-DOS 3.0, the latter supposedly supporting quad-density format. Will the 1000's disk controller recognize the higher density drive? If not, can you suggest a suitable replacement? Without technical documentation for the 1000, I can't proceed with this upgrade. *(Donald J. Mangold, Verona, NY)*

A Are you trying to boot an 80-track disk? If not, that's probably your problem. Eighty-track units have twice as many tracks in the same amount of space as 40-track drives. With a 40-track disk in an 80-track drive, the drive is still reading the 40-track disk's first track when it moves to the second track. To make this work you must force the 80-track drive to increment two tracks instead of one. Unfortunately you can't do this with a hardware modification. The only solution is temporarily to put one of the 40-track drives back online as drive zero and to format and make a system back-up to the 80-track unit using the DOS SYSGEN command (see the manual for details). I believe you're supposed to set one drive to DS0 and the other to DS1. Double-check this with your technician as it's very important. If I'm right you have both 80-track drives configured as drive 1.

By the way, you can get Tandy 1000 technical manuals from Radio Shack's National Parts division (900 E. Northside Dr., Fort Worth, TX 76102, 817-870-5662.)

Q Can you tell me who makes the CPU for Radio Shack's DMP-120 printer? The service manual lists the CPU as manufacturer's part number 2420NPEP159 and the label on the CPU reads "TEC 8403PX EP-159 Japan 7802068." When I asked Radio Shack's Consumer Service department about it, they said they couldn't give the manufacturer's name because it's a trade secret!

I opened the printer to repair a bad print head, and after that I started studying the CPU with a scope. I am slowly figuring it out but could go faster and better with a specifications sheet.

After less than an hour's use a print-hammer coil and its transistor went out. The coil, which normally has a resistance of 17 ohms, had heated enough to melt its plastic form and shorted to 1 ohm. What could cause such a thing in a new printer? *(Jack Stuntz, Ft. Collins, CO)*

A TEC stands for Tokyo Electronics Co. They're at 222 Kearny St., San Francisco, CA 94108; they make the DMP-120's CPU.

I can attribute such a printer failure only to a defective part. I hope you made Radio Shack do the repair, as the failure was well within the 90-day warranty period for defective parts or poor workmanship.

Q I recently bought a 128K Model 4. When I load TRSDOS 6.X into RAM, I have only about 28K left. My old Model I left me with 38K of RAM. I need at least 38K to run my programs. Do you know of a Model 4 operating system that will lesve me enough working room? *(M. Mucciolo, Floral Park, NY)*

A MULTIDOS or DOSPLUS gives you about that much room, with supply utilities that let you compress your programs to release more RAM for data and variable storage. Have you considered breaking up your program and using the Common and Chain commands to switch back and forth? That's what those commands are for.

Q Several years ago, while in Japan, I bought a Model I from an authorized Tandy dealer. The equipment worked fine until recently, when drive zero started making a knocking sound. I took the bad drive to the local Radio Shack for repairs.

About five weeks later, when I asked about the drive, I was told the Radio Shack store wouldn't attempt to repair it without the proper schematics and repair manual, which were unavailable since the unit was manufactured in Japan. A label on the back of the drive reads, "Cat. No. 2601160A, Custom Mfd. in Japan for Tandy Radio Shack - AC 10V +/-10%, 50/60 Hz." Do you know where I can get manuals and schematics for my equipment, or can you suggest another solution? *(Jon C. Schultz, Sandusky, OH)*

A The only suggestion I can make is that you write directly to Tandy's Japanese division and ask for a service manual. Can anyone else help?

Q I use a Model III with a DWP-410 printer. SuperScripsit's user print codes are causing trouble with proportional spacing and right-justified margin. Codes for characters such as ½, ¼, and @ make the printout line spill past the right margin. I double-checked the manual to make sure I was allowing the correct amount of space. What's wrong?

Also, when using Profile III Plus, I occasionally get an "I/O end of file" error when printing labels. This happens with one file only.

Finally, I'm considering getting a 10-megabyte hard disk drive to use with Profile III Plus. One file covers about 20 floppy disks and it would be best, I think, to keep this all together. Can I transfer data files to hard disk? Will Profile III Plus run from hard disk? What problems can I expect? *(Carl H. Sturner, Earlton, NY)*

A This is the first I've heard of such a problem with SuperScripsit. Since the prescribed amount of room for your special characters isn't enough, have you tried incrementing the amount until you find the magic number that gives you perfect margins?

You obviously have a bad sector somewhere in that Profile III Plus file that's causing trouble. Try copying the file to a new disk. Or use a simple Basic program that loads each section of the file into memory and writes it to a new file name, displaying the information as it does so. This should help you pinpoint the bad area.

Yes, you can transfer your Profile III Plus files to hard disk. No, the version for standard floppy drives won't work off the hard drive. You have to buy a special hard drive version; it works just like the floppy version except that eveything defaults to the hard disk. You shouldn't have many problems once you get used to the new equipment.

Q As you know, the Model 4P has no cassette interface. I suppose Tandy thought a portable computer user had no business fooling with cassettes. Unfortunately, I use a 4P as my main computer and I certainly do need cassettes. I have a good supply of Model I software that I can't use. Do you know where I could get information about building a cassette interface for the 4P? Since the unit already has the Model III ROM on disk, which should include the cassette routines, it should be relatively simple to build such a device. Model 4 mode is unimportant; I'm only interested in loading my old Model I software. *(Michael Czuhalewski, APO, NY)*

A As yet, I haven't seen anything about a cassette modification for the Model 4P. One bit of warning though: Just because the 4P has a ROM image on disk doesn't necessarily mean the image includes the code for cassette routines. Can anyone help?

Q I recently bought a kit to expand my Model 4P's memory to 128K. From the advertisement I assumed the kit would have instructions for both the Models 4 and 4P, but it contained instructions only for the Model 4.

I installed the chips in the empty RAM sockets and tried to access the new memory with MEMDISK. However, my computer displayed the message, "Unable to install MEMDISK, requested banks in use." I assume there's more to the upgrade than plugging in the eight 4164 chips. *(Greg Denson, Hoover, AL)*

A: There's more to it than just plugging in the chips. The Model 4 requires a PAL (programming array logic) chip to use the extra 64K.

The 4P doesn't need a PAL chip, but you must move the board jumper between pin E12 and E13 to pins E11 and E12. That tells the computer that the extra bank of RAM is available. Sounds as if you have something else already using that extra RAM.

After you've moved the jumper, try again. Begin at first base with just your DOS disk booted up: no special drivers, filters, or other programs in memory (the configuration routine disabled). Now try installing Memdisk using memory bank zero. If you get an error, something is wrong with Memdisk; bank zero doesn't use the extra RAM.

If you don't get any errors, turn off the computer and start again. This time choose just memory bank 1. If you again get the error, "Requested banks in use," its time to trouble-shoot the chips you installed. Are they all oriented correctly, with their notches all pointing in the same direction? Try removing them and reinstalling them in a different order. If Memdisk still fails, you'll have to contact Radio Shack, as something is wrong with the program, the computer, or the chips.

Q: I have a cassette-based Model 1 Level II that I'd like to convert to disk operation. What do I need, where can I get some drives, and what will it cost? Can I do it myself? *(Lawrence Kiefer, St. Ann, MO)*

A: Upgrading requires an expansion interface to provide the disk controller circuitry and extra memory. Unfortunately, Model I expansion interfaces are becoming as scarce as hen's teeth.

The only company I know of still making them is MicroMint (561 Willow Ave., Cedarhurst, NY 11516, 516-374-6793). Micro Data Supplies (22295 Euclid Ave., Euclid, OH 44117, 800-321-3552) used to sell the LNW Model I Expansion Interface, but I don't know if they have any left. If you're handy with electronics, a series of articles starting in the October 1982 *80 Micro* tells you how to build your own.

Once you have the EI, you need to get a disk drive zero. Several companies sell them; check the *80 Micro* ads. Drive zeros differ from other drives in that they contain a terminating resistor pack. This electronically protects the disk drives and floppy disk controller from spurious electronic noise and properly ties the drive cable data lines to ground. Without this terminating pack, you risk ruining the floppy disk or disk drive controller circuits or both.

As a matter of fact, you could try looking in the *Computer Shopper*'s classified ads. You might find someone willing to sell a Model I for less than it would cost you to buy an EI and new drives.

If you should get a Radio Shack EI, get Gold Plugs from EAP (P.O. Box 14, Keller, TX 76248, 817-498-4242). These solder onto the edge card connectors of your keyboard and expansion interface, eliminating corrosion that causes disk resets and data reliability problems between the keyboard, EI, and disk drives.

Next, get Aerocomp's Model I double-density board (Redbird Airport, Bldg. 8, P.O. Box 24829, Dallas, TX 75224, 214-339-8324). This doubles your drives' storage capacity and makes it much easier to run complex software. I've used their board in my computer for many years and never had a problem with it. It's also a snap to install.

Considering the cost of these items, however, it might be cheaper to buy a new Model 4 and upgrade it to disk drives instead.

Q: Your answer to Craig L. Cole's question about color expansions for the Model 1 (February 1985, p. 18) surprised me. You said you didn't know of any companies that made color boards for the Model 1. The article "The 80 Goes Color" in the May 1983 *80 Micro* (p. 90) describes the construction of a high-resolution color board for the Models 1 and III. This board sounds made-to-order for Craig Cole. *(Dell M. Garner, Poughkeepsie, NY)*

A: Thanks for the reminder. Craig needs the June 1983 issue also, because the construction article was a two-parter.

Q: Our business college bought a Model II and a 20-megabyte hard disk drive from an individual; both are used but in good shape. Quality Computer Sevices originally sold the hard drive, but when we tried to register as the new owner, we discovered they were no longer in business. Our problem is that we have no documentation for the hard drive.

Due to an electrical problem, we glitched a portion of the boot, so we're unable to get a ready prompt and are locked out. Do you, or any of your readers, have some information on the Q.C.S. hard drive? One other question: We plan to run CP/M on the Model II and use the MUMPS language and the Fileman data base package. Also, we want to set up the Model II for more than one user. Is there a type of multiplexer we can use for multiple user access via the RS-232 port? Ideally, we'd want all users to be able to log on, but they'd have to share actual CPU time. One company recommended using a switching multiplexer with CP/M and said we wouldn't need a special operating system such as Xenix. But other companies say multiuser operation on a Model II isn't available without Xenix. Any ideas? *(Greg Casselman, Chillicothe, OH)*

A: Can't help you with the Q.C.S. Hard Drive; can anyone else?

Radio Shack originally designed the Model II as a single-person work station. Multiplexing the CPU to more than one person will slow down the computer somewhat. I haven't seen any field operations using the Model II as you propose, but you can do it. You don't want to use CP/M, though; use MP/M, the multiuser version of CP/M.

You'll have to contact Digital Research about the particulars, but I believe you can easily and simply set up the Model II to accept inputs from the RS-232 ports. This would support three users, one at the keyboard and two via the two RS-232 ports. The disadvantage is that this severely decreases the amount of RAM available to each user. In fact, I think you'll find that each user will have only about 16K to work with.

What might be better would be to get a multiplexer for the hard disk and let separate computers access the hard drive individually.

Q: I bought and installed a Mapper I kit from Omikron for my Model I so I could run CP/M-based programs. I followed their installation instructions, including the capacitor modification (I have the new type CPU), but I still can't run CP/M. The message I get is "DBOS ERR ON A: BAD SECTOR". It's definitely not the drive or disk; I tried three different disk drives; also I got the same result using the master disk. TRSDOS works OK, though.

Since it's my understanding that Omikron is out of business, can you or one of your readers help me solve this problem? *(George Verlinden, Westminster, CA)*

A: Since you can't get even the master disk to boot up, I suspect your master disk is blown. If the problem were hardware, I suspect that even TRSDOS wouldn't work right.

You need a new disk. Omikron is still around; they're just keeping a low profile as they try to recover from Chapter 11 and make good on all the orders they were supposed to send customers. Write to Paul Kelley, 1127 Hearst St., Berkeley, CA 94702, with a description of your problem and you should be able to get a new disk.

Terry Kepner is a freelance writer and programmer, and an 80 Micro associate editor.

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MONTEZUMA MICRO

PRESENTS

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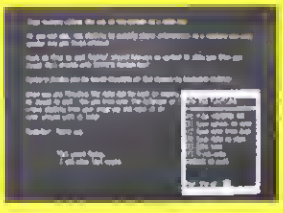

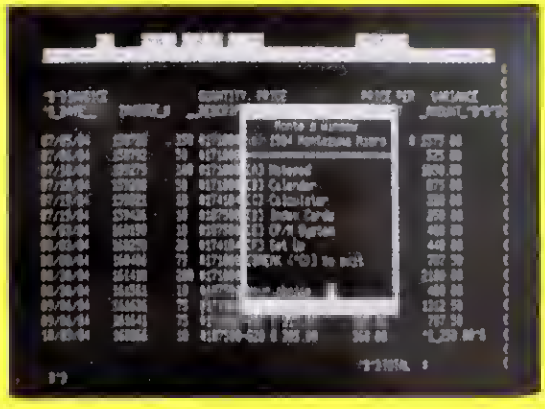

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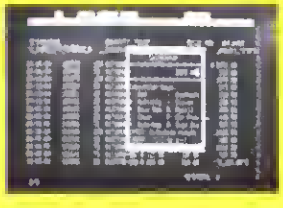

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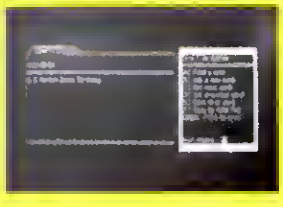

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Tandy to 4P: Drop Dead

Tandyland

"The TRS-80 Model 4P went on sale on April 22, 1985, for $649.95 and will remain at that price until the last one is gone. We've stopped production on the product and when the last one is sold, there will be no more 4Ps."

So spoke Tandy's director of market planning, Ed Juge, confirming speculation that Tandy's 8-bit transportable was on its way out (see the Photo). Only a month before, Model 4 line manager Stewart Weinstock denied that Tandy planned to discontinue either the 4 or the 4P. As for the Model 4, Juge insists that the desktop still has a long life ahead of it.

Photo. Time runs out for the 4P.

Juge said Tandy axed the 4P because "it was not a particularly hot seller," although he conceded that it has a loyal following. Juge added that 4P owners needn't worry about repairs and support. According to Tandy policy, parts will continue to be available for seven years after they sell the last machine. And as long as the Model 4 survives, users can find software for the 4P.

From the matter of the 4P, Juge went on to talk about Tandy's plans for MS-DOS computers. Stories in the *Wall Street Journal* and *Infoworld* last April cited speculation that Tandy would soon introduce two new MS-DOS computers: a portable, rumored to be the Tandy 800, and a PC AT clone, possibly called the Tandy 4000.

Juge called my attention to a statement by Tandy chairman John Roach summing up Tandy's attitude toward MS-DOS. Said Roach, "Obviously you've got to deduce that Tandy will stay in the forefront of the MS-DOS market and examine new products as the market evolves. In that way we will introduce products that make sense for us in that market."

But Tandy isn't in the clone business, according to Juge. When Tandy markets a product similar to another company's, he said, they try to take it further and make a better machine. "The only true clone we have is the Tandy 1200 and that was brought out because it was a good deal."

Juge said Tandy had no plans to bring out any new MS-DOS products before the end of summer, no laptops and no AT work-alikes. After that, we'll all just have to wait and see.

Price cuts on Tandy's computers were the rule last April. The Tandy 2000 and the 1200 each went down $1,000 in price to $1,999. The Model 12 was going for $1,595, and the Model 100 took another price cut. Even the hot-selling Tandy 1000 was ripe for a markdown. Securities analyst Joan McKay of Kidder Peabody indicated Tandy would probably drop the price of the 1000 by 25 percent. Tandy's John Roach seemed to concur. "It can't stay up there forever," Roach said, referring to the 1000's current price tag of $1,199.

All this price slashing is part of Tandy's new aggressive pricing policy. But even a $1,900 price cut might not be enough to keep the Model 12 alive. The low price sparked some interest in the 12 according to Tandy, but sales remained less than stunning. Competition from MS-DOS computers and from the remodeled Tandy 6000 hurt the 12's sales.

Still, the word from Tandy was that they wouldn't discontinue the Model 12 in the near future. Ed Juge explained the 12's huge price cut: "The cost of the Model 6000 has come down so dramatically with so much more horsepower that the price spread did not make much sense." In the past, an upgraded Model 12 cost $4,099 while the Tandy 6000 cost $4,495. Now Model 12 owners can upgrade for $3,395, a difference Tandy hopes will help move the machine off Computer Center shelves.

It wasn't all glad tidings when Tandy announced its third-quarter earnings. Overall sales for the quarter were $670.5 million, up from $656.1 million for the same quarter a year ago. But earnings per share fell to 25 cents from 60 cents in 1984.

The share earnings drop resulted from an $18 million write-off on computer hardware and software, goods that had declined in value since Tandy bought them. Tandy said declining prices for semiconductors and some computer subassemblies, as well as deterioration in market pricing of competitive equipment, made it prudent to write down raw materials and finished goods associated with the Tandy 2000. The write-off also included the cost of upgrading the Model 100 to 24K and the cost of some software associated with older computers.

The move might hurt Tandy's standing with investors, which had been high (see the June 1985 Pulse Train), but

John Roach sees benefits down the road: "This write-off of computer-related materials and products compensates for recent changes in market conditions and should permit us to continue to aggressively pursue our goal of providing outstanding value in microcomputer hardware and support."

Hot Items

Now that Tandy is committed to MS-DOS, some TRS-80 third-party software makers are following suit. Notable is Dallas-based Powersoft, which introduced an MS-DOS version of its venerable Super Utility disk-zapping package. In a simultaneous move, the company took the copy protection off the Model I/III/4 version and said it would provide Super U's /CMD file to registered owners for a small extra charge. The MS-DOS Super U costs $89.95 for first-time buyers; registered TRS-80 version owners get a $10 discount.

The Model I/III/4 version is widely considered an indispensable disk-repair utility, beloved by hackers and do-it-yourself types. In catering to the MS-DOS market, Powersoft took great pains to make the product easy to use and understand, even for users unfamiliar with disk-storage formats. Peter Norton's Norton Utilities has become the MS-DOS standard for saving disks and files. But TRS-80 owners are a loyal lot, and Powersoft is hoping their allegiance will help them find a place in Norton's neighborhood.

Powersoft's president, Dennis Brent, told me he wanted to avoid downgrading The Norton Utilities. In fact, Powersoft is pushing its new product not as an adversary to Norton's, but as a supplement that provides more utilities for saving files and reading blown disks.

While some old TRS-80 products are going MS-DOS, the opposite is also true. One of the trendiest MS-DOS applications, idea processing, is finally accessible to Model 4 owners in a product called Kamas. According to Adam Trent of Kamasoft, the program's manufacturer, Kamas works for people in text-intensive professions as an outline processor similar to ThinkTank, while at its highest level, you can use it to create custom applications, much like dBase II. At the time of the product's announcement, Kamasoft expected the program to run on the Models 4 and II/12/6000 running CP/M.

MicroTrends

Some of the big American micro-computer companies took their wares to West Germany last spring for Hanover Fair, the European equivalent of the Consumer Electronics Show. A number of hardware manufacturers, including Tandy, were showing Digital Research's new operating environment, GEM, on their equipment. Officially, however, Microsoft Windows is still the windowing product Tandy's backing. Microsoft didn't appear; in fact, its only obvious presence was through the many MSX (Japan's standard Microsoft operating system) machines at the fair.

Table. Top word processors in worldwide market share.

Europeans seemed to be warming up to the 80186 technology Tandy pioneered in its Tandy 2000. Overseas firms showed interest in Intel's 80186 in anticipation of IBM's use of the chip in a new, low-end computer. The feeling in Europe is that IBM will use Intel's 80286 in the IBM PC II; the PC AT already uses the 80286.

One of the more interesting new product announcements to come out of Hanover Fair introduced Brother's Twinwriter 5, a double-action printer incorporating a daisy-wheel and a dot matrix printhead in the same housing. The daisy wheel puts out 36 characters per second (cps), while the dot-matrix alternative prints 140 cps. Brother is aiming the product at small businesses that need both printing capabilities.

Last year, word processors ac-counted for one-fourth of all applications software sold worldwide. According to Infocorp, 1.2 million packages went for an average price of $275, for a total of $300 million in sales.

The top five sellers in the word processing market worldwide included Radio Shack's Scripsit, which placed third with 13 percent of the market (150,000 units sold). Topping the list was Wordstar with 24 percent of the market, while Applewriter was a close second at 22 percent. PFS:Write was fourth with 8 percent; Magic Word with 7 percent came in fifth (see the Table.)

When I asked Tandy's Ed Juge about Scripsit's strong showing, all he would say is that the figures probably weren't too far off—Tandy doesn't release actual sales totals for their products.

Update

As this column went to press, word came in from Fort Worth that Tandy expected to start an Express Order Hardware service in July or August. EOH complements Tandy's existing Express Order Software service, through which customers can order non-Tandy programs from Radio Shack stores.

According to Tandy's Deborah McAlister, the EOH system will carry peripheral items such as add-on cards, cables, and other noncomputing devices. Negotiations with manufacturers were still underway when I spoke with McAlister.

Tandy's support for Digital Re-search's GEM operating system became more concrete late last spring. The two companies signed an agreement that would make GEM, a graphics environment manager for MS-DOS computers, available through Radio Shack's Express Order Software service starting in June.

What's new on the small computer scene? Confusion, that's what. A recent market study by Frost and Sullivan distinguishes among four categories of portable computers. The smallest of the small are the lap-tops, like Tandy's Model 100/200 line. Briefcase computers, like Hewlett-Packard's HP-150 or the Apple IIc, come next. Of course, lap-tops fit into a briefcase, and you can use a briefcase model on your lap. But never mind. The two remaining categories are transportables, like Tandy's discounted Model 4P, and Apple Macintosh-type computers.

Frost and Sullivan predicts 5.9 percent annual growth for the portable market overall, but market prospects vary wildly from category to category. For example, the study points to declining sales in transportables, bearing out Tandy's decision to stop making the 4P. Prospects for laptop sales, in which Tandy is the industry leader, are better, although the survey warns that revenues may fall.

The biggest growth from now through the end of the decade should come in briefcase-size machines—14 percent growth in dollars, and 24 percent in unit sales. As for the Macintosh, Frost and Sullivan expects it to become the number-one portable computer, with unit sales jumping from 200,000 in 1984 to 550,000 in 1989.■

Photographs by Frank Cordelle

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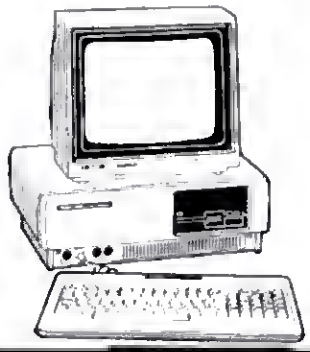

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The Mad Patcher

Here's an improved version of one of my TRSDOS 1.3 patches ("Patch Work," January 1985, p. 112). Patch 8 modifies the Free command to give you the total number of free granules on a disk, but the patch also shortens a prompt in the rarely used Prot (PW) command. No big deal, but the patch below doesn't affect the Prot prompt:

PATCH *6 (ADD = 5483,FIND = 26,CHG = 3C)
PATCH *6 (ADD = 5526,FIND = 4D61737465 7220,CHG = FE28D8F1C3FC5B)
PATCH *6 (ADD = 5D52,FIND = FE28D0, CHG = CD2655

You must install all three patch lines. Also, if you already have patch 8 in place, you must undo it by reinstalling the original patch, swapping the numbers in the three patch lines' Find and CHG fields.

For truly masochistic readers, I have a 29-line, wall-to-wall patch that inserts

the CAT command in the TRSDOS 1.3 Help listing, replacing the nonfunctional Route command. I'll be happy to mail the patch listing to anyone who sends me a stamped, addressed envelope and a dime to cover copying costs. I'll also include the listing for an experimental patch that lets you run TRSDOS 1.3, once booted, from drive 1 in a two- or three-drive system.

Andy Levinson
11575 Sunshine Terrace
Studio City, CA 91604-3835

Look for a sequel to "Patch Work" in this issue.

—Eds.

Zap Gap

The Figure shows changes to David A. Williams' Disk Zapper ("Zap Master," April 1985, p. 62) for editor/assemblers other than MZAL. We'd like to thank Thomas E. Oakes of N. Liberty, IN for bringing them to our attention.

—Eds.

```
Change line 120 to:    120          ORG 3100H

Inaert the following macro code expanaions immediately
after the ORG statement:

            SVC     MACRO    @V1
                    LD       A,@V1
                    RST      28H
                    ENDM

            CPR     MACRO    @V1
                    SCF
                    CCF
                    SBC      HL,@V1
                    ENDM

            MOVI    MACRO    @V1,@V2,@V3
                    LD       DE,@V1
                    LD       HL,@V2
                    LD       BC,@V3
                    LDIR
                    ENDM

Depending on your editor/sssembler, you might slao have to
make the following chenges:

In linea 1210, 1270, and 1400, change the code LD   BC,IX
to two lines:
                    PUSH   IX
                    POP    BC

In line 3270, chsnge the code LD    HL,IX
to two lines:

                    PUSH   IX
                    POP    EL

You might have to change the labels MOD, MODA, NOT, and
NOTA if MOD and NOT are reserved words in your assembler.

EDAS users should also mske the following chsngee:

      @3910          DC       14,' '
      @3920          DC       80,' '
      @3940          DC       14,' '
      @3950          DC       80,' '
      @4280          DC       80,' '
      @4290 CMD      DC       80,' '
      @4300          DC       160,' '
```

Figure. Modifications to Disk Zapper for editor/assemblers other than MZAL.

DD Diagnosis

I discovered a zap to Dave Stambaugh's Floppy Doctor diagnostic program—the zap lets Model I owners using Radio Shack's double-density modification test for single- and double-density operation. You make the zap to relative sector 223 on the diagnostic disk. I used NEWDOS/80's Superzap utility. If you use Superzap, make sure the drive you're using has the following single-density PDrive attributes:

TI = A, TD = A, TC = 35, SPT = 10, TSR = 3, GPL = 2, DDSL = 17, DDGA = 2

If the diagnostic disk is in drive 1, invoke Superzap and type in:

DD <enter>	(Display a disk sector)
1,223 <enter>	(Display sector 223 on drive 1)
MOD17	(Modify byte 17 in the sector)

Now, change

EC 37 36 FF 36 D0

to

EE 37 36 80 36 E0

by typing in the second set of 6 bytes. Press the enter key, press "Y," press the enter key again, and type in EXIT.

To use the modified disk for double-density testing, you must have the test disks in double-density format. Also, readers who don't want to alter their original diagnostic disks can create a

back-up by using the Superzap CDS command to copy the data on tracks zero, 17, 20, and 22 to a second disk.

Mike Strong
1332 E. Walnut St.
Annville, PA 17003

Y, Oh Y

In the May 1985 Ask Tandy (p. 128), a reader asked about the DMP-400 printer's faulty lowercase "y" in correspondence-quality or proportional print mode. You can work around this by telling the printer to do a 1/12 forward line feed, print a lowercase y, do a full reverse line feed, then 11 1/12 forward line feeds (in hexadecimal 1B32791B0A1B321B3 21B321B321B321B321B321B321B321 B321B32).

The easiest way to use this is to assign the printer commands to a programmable function key, like LeScript's, then search for and replace all lowercase y's. Although this slows down printing a bit, it greatly improves the look of your document.

Albert Fiorello
49 Garfield
Lancaster, NY 14086

Help, Please

I have a Radio Shack digitizer that I bought to use on my Model II. I'd like to use it with a Model 4P but I don't have the software to do so. The digitizer manual contains machine-language software to connect the digitizer to the Model III's or Model II's RS-232 port. Does anyone know the Model 4P and machine language well enough to help me modify these programs or write new software?

Gary S. Way
P.O. Box 356
Allegan, MI 49010

I'm interested in obtaining Volume 1 issues of the *LDOS Quarterly*, later known as *LSI Journal*, published by Logical Data Systems as support for LDOS.

Bill McQueen
805 Ely Road
Hixson, TN 37343

I recently bought Radio Shack's Stock Market Trend Analysis (catalog 26-1509) and found one of the cassettes was missing. Radio Shack has discontinued the product and can't find a replacement. Please contact me if you have a copy of the Short Term and Intermediate Term Market Trend programs.

George W. Frangia
1491 Sandpiper Way #26
Salt Lake City, UT 84117

I'm looking for a printer driver to use Scripsit 2.1.0 on the Models II/12/16 with a serial dot-matrix printer.

Joel Samoff
School of Education
Stanford University
Stanford, CA 94305

I have a Model III and an Epson FX-80 printer. I'm using the SuperScripsit driver from the May 1983 *80 Micro* (p. 125), but I find it lacking in a few areas. For instance, I can send the code for proportional spacing to the printer at the beginning of the text, but the right-justify feature won't work this way. Also, the printer adds an extra line feed on each page. Can anyone help me out with a better driver?

Kent Cronin
Box 843
Port McNeill, BC
VON 2R0 Canada

Error Trap

Our BBS Directory (July 1985, p. 41) incorrectly listed the following private telephone numbers as BBSes: 619-565-7340 in California, and 603-924-6065 and 603-882-5041 in New Hampshire.

—Eds.

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Superlog 4: A Flexible Data Base at the Ready

by Gary Ludwick

★★★★★

Superlog 4 runs on the Model 4/4P (64K, 128K recommended) and requires TRSDOS 6.X. KSoft Inc., 318 Lakeside Drive, Brandon, MS 39042. Express Order Software number 90-0291. $119.95. Utilities package $49.95.

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Superlog 4 is the kind of data base I like: It accommodates the unpredictability of human nature. Rather than enforcing the rigid, unalterable structure of traditional data bases, Superlog lets you change Model 4 records and fields at any time: You add new information to existing records wherever you need to. But that's not Superlog's only remarkable feature. In a 128K system, you can run Superlog concurrently with another program, calling up the data base from high memory when you need it. Also, Superlog lets you read data from or write data to other files. Finally, Superlog 4 provides a set of utilities that enhance program operation.

How It Works

KSoft describes Superlog as an "electronic notebook" rather than a data base to emphasize its flexibility—you can add information to the data base as you would to a notebook. For example, say you have a notebook of names and addresses and you want to add telephone numbers. You call up the records of interest (or all records) and enter a new field and the phone number. It's that simple.

Superlog acts like a series of notebooks. Each notebook (data base) can hold 32,767 pages (records), each of which stores up to 1,024 characters. How many data bases you create is limited only by the number of blank disks you want to buy.

Once you install Superlog in protected high memory, you can either call it from an applications program or run it in a foreground mode as you would any other applications program. (With a 64K Model 4, you can only use Superlog in the foreground.) You can use Superlog with any other program, as long as the other program doesn't take up both extra 32K memory banks.

To interrupt a working program and call up Superlog, you press the control and both shift keys simultaneously. The Superlog logo appears and asks you for the file (data base) you want. Type in the name of the data base file resident on one of your disk drives, and Superlog takes you immediately to page 1 of that data base. Hit the break key and you're back where you left your foreground program.

Creating Notebooks

Superlog 4 is a sophisticated and somewhat complicated program. KSoft has, in effect, combined a word processor with a data base in a unique way to give you Superlog's notebook features.

To create your data bases, you first supply a name at the file name request prompt. If the data base doesn't already exist, Superlog 4 asks if you want to create it. A "yes" response does so and shows you page zero of that data base.

After the header, you can enter information in any format you want. To repeat a set of fields throughout the data base, you duplicate as many pages as you want (up to the limit of 32,767). If your disk can't contain the requested number of pages, Superlog will write as many as possible, then return a "Disk full" message.

Editing Your Notebooks

Once you create a data base, you can edit and manipulate the data in many ways. Superlog offers the same kinds of editing commands as any good word processor. It offers a couple of other unique features as well.

Cut and Paste is a feature unavailable on previous versions of Superlog. It lets you take information from one part of the current data base (or any Superlog data base) and move it to a new position.

If you have a 128K Model 4 with Superlog running in the background, you can move data from your data bases into any foreground program such as a word processor, Basic, an editor/assembler, or into TRSDOS itself.

Exactly how Superlog 4 does all this is a bit complicated. It creates 26 buffers (one for each alphabet key) and lets you assign information from your data bases to any of them. A single buffer, or any combination of buffers, can hold up to 20,000 bytes of information. Once you've marked the desired data and assigned it to a buffer (Cut), you can then move to any foreground program and write that information there (Paste).

This function offers all kinds of possibilities. After weeks of working with Superlog 4, I'm still coming up with new uses for Cut and Paste. You'll probably use Superlog's search function most often. Superlog offers both case-specific and case-indifferent searches. In addition, you can search for multiple words

Illustration by Katherine Mahoney

and phrases or for unknown characters and variations through a wildcard search function. It's a powerful command that works fast.

Utility Programs

Superlog 4 also comes with a number of utilities. One lets you convert earlier versions of Log or Superlog to Superlog 4 and TRSDOS 6.X format. Another creates a calendar/log file you can call up for any month of the year, even from a foreground program. Superlog also provides a quick-reference help file, as well as a line printer utility that lets you automatically print out the data bases.

Superlog gives you another utility that's really a program in itself, Key/CMD. This program works with the cut-and-paste functions so you can load or append buffers from a disk file or a text string and insert control characters. For instance, this would let you move text from a word processing file into buffers and then paste it into various data bases. Or you could load data into key-designated buffers, perform various editing functions, and rewrite it to the original disk file. Like most Superlog 4 functions, its use is limited only by your imagination and needs.

New Utilities

KSoft recently introduced a package of five utilities to give you even more control over your Superlog files. These five programs let you insert and delete groups of pages at any point in the file, move one page or block of pages to another position in the same or different files, copy pages from one file to another, change the header titles on any group of pages, and renumber Superlog 4 files that you have merged together with the DOS Append command. I tried all these machine-language utilities and found they further enhance Superlog's data base/editing capabilities.

While they offer much additional power to the experienced Superlog 4 user, the key word here is experienced. I would suggest that new Superlog 4 users gain an expertise with the main program before venturing into these powerful utilities.

Conclusion

Superlog 4 fills a need for a full-featured but flexible data base that you don't have to be a programmer to use effectively. The accompanying manual is a model of clarity. It isn't huge (42 pages) but it thoroughly explains every aspect of Superlog 4.

One thing that would help in getting started is a small reference card covering Superlog's extensive command structure.■

GW-Basic Compiler: A Poor Performer

by John B. Harrell III

★★

MS-GW-Basic Compiler (version 5.05.00) runs on the Tandy 2000 (256K) and requires two disk drives. Tandy/Radio Shack, One Tandy Center, Fort Worth, TX 76102. Radio Shack catalog number 26-5251. $299.95.

Easy to use: ★★★★☆
Good docs: ★★★★☆
Bug free: ★☆☆☆☆
Does the job: ★☆☆☆☆

I have been waiting to use Microsoft's GW-Basic compiler since I started using the Tandy 2000. Now that I've had a go at it, I'm disappointed. While the compiler increases program speed by up to 100 times, it performs abominably when writing to the screen in color, and the compiled color graphics code won't even run under the newer version of MS-DOS (2.11). This product has some serious problems.

The Compiler Package

One of the first surprises you'll notice with this package is its small, 100-page documentation. The manual addresses only the compiler's operation and the specific differences between it and the Basic interpreter. But this isn't a critical drawback since the compiler's commands are so similar to those in Basic that you can use your Basic reference manual as a guide.

The package disk contains the compiler program, two libraries, and a run time support module. Many of the compiled instructions call support routines in the libraries, similar to the way Model I/III Basic makes calls to the ROM.

Because of Microsoft's distribution requirements, the compiler has two libraries. One provides a complete implementation of the compiler language with a link to the run time support module. This module, a separate file on the disk, loads when you execute the compiled program. You can't distribute the run time module without first signing a licensing agreement with Microsoft.

The second library contains all the run time support and creates a stand-alone program that you can distribute as long as you state that you compiled the program using Microsoft's product. However, this library does not entirely support the language. Specifically, it doesn't recognize the Common statement, and it treats the Chain statement as a Run command. Consequently, you can't easily share data in a system of programs when you link them to this library.

AUTO	LLIST
BLOAD	LOAD
BSAVE	MERGE
CONT	NEW
DELETE	RENUM
EDIT	SAVE
ERASE	SYSTEM
LIST	

Figure 1. The GW-Basic compiler doesn't support these Basic commands.

Using the Compiler

The compiler differs from the Basic interpreter in operation, implementation, and language. The manual does a good job of explaining these differences, however. In addition, the compiler fails to support some Basic commands (see Fig. 1).

Tandy recommends that you test the compiler with the demonstration program provided. First, you run the compiler and type in the responses to the prompts, clearly defined in the manual. After that, the compiler compiles the source program and creates an object file as an intermediate output.

You then convert the object file into an execution file using the linkage editor, which also generates a listing you can send to the video, a printer, or a file.

The compiler uses switches to execute special functions during compilation or to alter a normal compiler function (see

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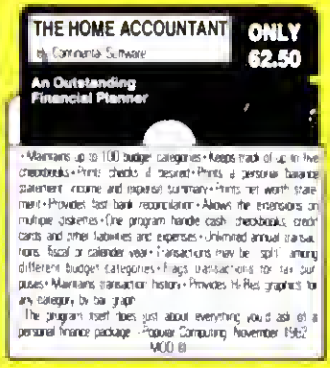

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Table 1). For example, one command lets the compiler accept unnumbered Basic programs resulting in a faster final program; another lets you invoke a tracing function so you can follow program logic.

You can also use metacommands in your source code to spell out what you want the compiler to do. Metacommands control the source listing format and provide an include facility; they're similar to Basic comment statements.

Performance

To its credit, Microsoft's compiler is easy to learn to use; in terms of function and program logic, it's highly compatible with Microsoft's other interpreters.

On the other hand, the performance of the generated code gets the lowest possible evaluation I can give it. In almost every instance, it performs slower than a Basic program when writing text to the video display, especially when writing in color.

I made a series of tests to see how the compiler performed. I tested full-screen graphics performance and text and graphics intermixed, speed of writing full 80-character lines in both color and black and white, and computational performance using the Sieve of Eratosthenes prime number generator.

The compiler produces graphics slowly. In four out of the six graphics tests, the interpreter handled information faster than the compiler (see Table 2).

If you have to print a lot of information to the screen, you're out of luck. The best performance you'll get out of the compiler is that either equal to the interpreter (MS-DOS 2.11) or inferior (MS-DOS 2.00 (see Table 3)).

The compiler handles quantities of data or computations fast. The compiler took only 0.8 seconds to complete the Seive of Eratosthenes test, while the interpreter took 81 seconds.

In addition to these results, I noted that the generated color graphics code simply would not run under MS-DOS 2.11. Apparently, Microsoft patched the compiler code generators to compensate for the inadequacies in the earlier operating systems.

The compiler exhibits a few other problems. The Clear Screen command doesn't always work. Midway into the program run, the screen turns into a jumble and is totally unusable.

The Color command for selecting inverse video doesn't work like the Basic interpreter's. You select inverse video for only a partial line with the interpreter, but the compiler inverses an entire line of text unless you turn on normal video at the end of the text. Also, I couldn't turn off the cursor in the color mode and it was annoying to watch it slowly jumping all over the screen.

Conclusion

I have used Microsoft's Basic compiler under CP/M and TRSDOS 8.X and haven't had any troubles with them. This review takes issue with its implementation on the Tandy 2000 and, specifically, the screen-handling routines.

Tandy promises an upgraded version of the compiler soon that should fix most of these problems and make it compatible with MS-DOS 2.11.

Unless you compile programs that only work in black and white, I can't recommend this compiler. Its performance is totally unsatisfactory.■

Category	Switch	Result
Conventions	/4	Compiler uses language convention of older Microsoft compilers.
	/T	Invokes execution conventions of older Microsoft compilers.
Error-handling	/E	Generates a line-number address map.
	/X	Maps each statement to a physical address.
Special switches	/A	Lists equivalent 8086 code for each source code line.
	/D	Generates additional code for debugging and error-handling.
	/N	Minimizes line-numbering constraints.
	/O	Generates references to alternate function library.
	/R	Stores arrays in row-major order.
	/S	Writes string literals to the output file.

Table 1. Special switches the GW-Basic compiler supports.

Program	Interpreter time (seconds)	Compiler time (seconds)
Graphics.BAS bar chart	2.8	8.1
Graphics.BAS curves	12.3	4.9
Graphics.BAS area plot	7.8	18.1
Graphics.BAS pie chart	11.4	23.4
American flag	9.1	10.3
Confederate flag	17.4	35.2

Notes:

*The significantly faster time for the curves segment of Graphics.BAS is indicative of the compiler's performance in computations and should not be construed as graphics performance.

*If you compile Graphics.BAS, you will get a run-time error indicating a type mismatch while drawing the area graph. This is caused by the Draw command's limitation.

Table 2. Color graphics performance of the GW-Basic compiler.

	MS-DOS 2.00.02		MS-DOS 2.11.01	
Screen mode	Interpreter (seconds)	Compiler (seconds)	Interpreter (seconds)	Compiler (seconds)
Black & white Mode zero	1.5	1.7	1.3	1.3
Color Mode 3	4.3	33.3	2.8	9.5

Notes:

*This program consisted of a simple For...Next loop that counted from 1 to 24, performed a Locate for each video row, and then wrote a string of 80 characters. Screen mode was zero for the black-and-white tests and three for the color text tests.

*Even though the times for MS-DOS 02.11.01 show significant improvement, this is attributed to the improved BIOS code and not the compiler. Further, the video screen was instantly set into bright yellow with bright white letters and could not be changed, making the screen virtually unreadable.

*BASIC 01.02.00 was used under MS-DOS 02.00.02 and BASIC 01.03.00 was used under MS-DOS 02.11.01.

Table 3. Compiler performance writing text to the screen.

Three For the Road

by Marc-Anne Jarvela

If you often use a laptop computer to work out of your briefcase, you'll probably want to print out a document at some point. Portable printers will do the trick—they're small enough to fit in your briefcase and they run on batteries or ac power. You'll find a number of them available, both dot-matrix and letter-quality, in different price ranges and with various features.

I reviewed three portable printers, two thermal dot-matrix and one letter-quality (see the Photo). The thermal printers, the ThinPrint 80 and the Hush 80, are quiet but require special paper. The impact printer, the ThinType 80, works like a standard desktop printer and produces near-letter-quality text, but it's slow and noisy (see Table 4 for a list of specifications).

★★★★

ThinPrint 80. Axonix Corporation, 417 Wakara Way, Salt Lake City, UT 84108. $339.

Easy to use: ★★★★☆
Good docs: ★★★★☆
Bug free: ★★★★☆
Does the job: ★★★★☆

★★★★

Hush 80. Ergo Systems Inc., 26254 Eden Landing Road, Hayward, CA 94545. $159.99.

Easy to use: ★★★★☆
Good docs: ★★★☆☆
Bug free: ★★★★☆
Does the job: ★★★★☆

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ThinType 80. Axonix Corporation, 417 Wakara Way, Salt Lake City, UT 84108. $429.

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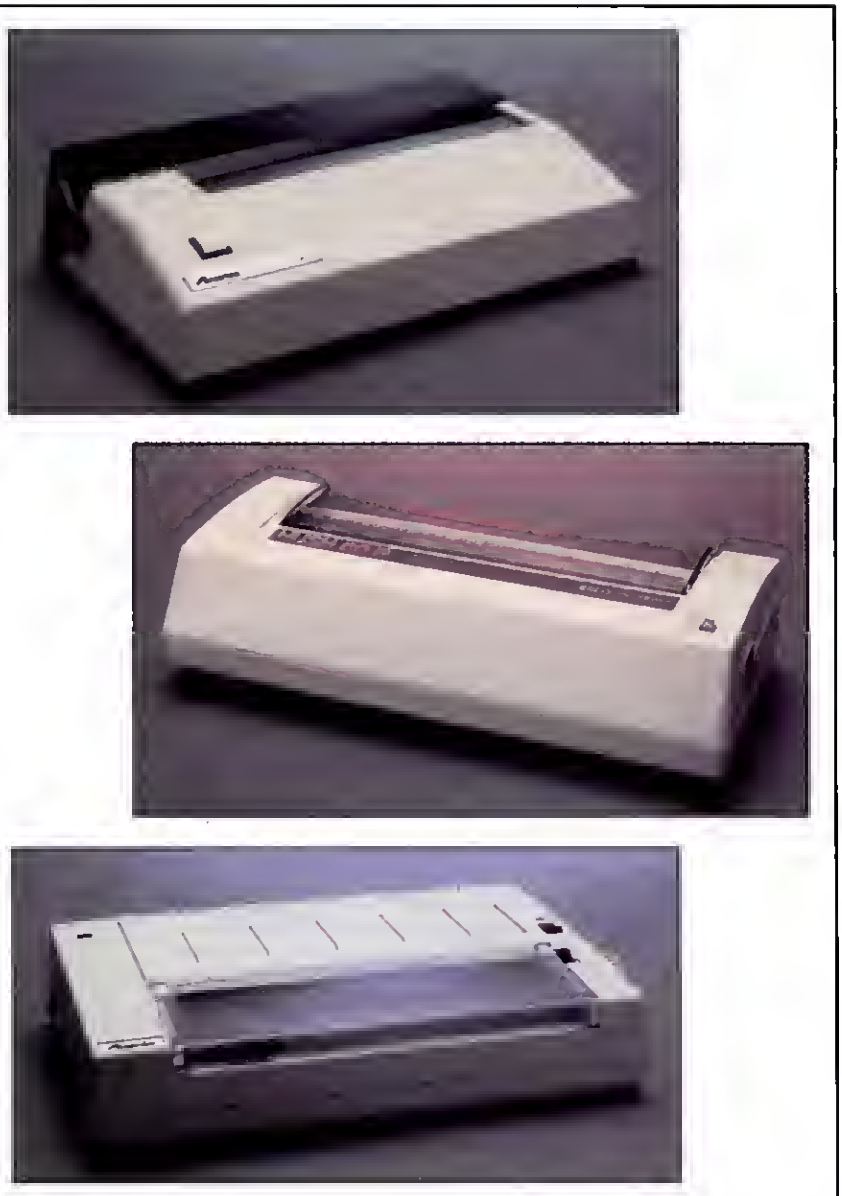

Photo. Three portable printers, from top to bottom, the ThinPrint 80, Hush 80, and ThinType 80.

The ThinPrint 80

The ThinPrint 80 is a compact thermal printer. It comes with either a parallel or serial interface and uses 8½-inch roll paper, handily stored inside the printer. A slide switch selects between the two print modes: normal 80 characters per line and compressed 136 characters per line. It also has continuous dot-addressable graphics capability.

This is a true intelligent printer with bidirectional look-ahead printing (after it prints one line left to right, it examines the next line in the buffer and selects the most efficient printing direction). You can adjust the print intensity by turning a small knob at the rear of the printer.

The ThinPrint runs on a built-in rechargeable NiCad battery pack and comes with a recharger. If you don't use the printer for two minutes, its auto shut-off feature kicks in.

You only have to worry about a couple of buttons with the ThinPrint, and you can easily get at the internal DIP switches to set up the printer. The manual is clear on this point and I didn't have problems getting the printer running.

Of the two thermal printers I reviewed, I liked this one better because it offered features that fit my needs, like intelligent printing and variable print density.

The Hush 80

This thermal dot-matrix printer is fast, quiet, and simple to use. Like the ThinPrint, it stores its 8½-inch-wide roll of thermal paper internally, so you don't have to carry it separately (you can't use single-sheet paper, though).

The Hush 80 comes in three configurations: serial- or parallel-interface and Commodore-compatible. The printer itself weighs only 25 ounces, the paper adds another 11 ounces, and the NiCad weighs 12 ounces. All told, the printer

Photographs by Frank Cordelle

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weighs no more than 3 pounds.

The Hush 80 prints at a fast 80 characters per second, and does it so quietly you could talk on the phone next to it. It supports 129 different characters, including international characters. You can choose from three printing modes: the standard 80 characters per line, expanded mode with 40 characters per line, and compressed mode with 160 characters per line. You can also print dot-addressable graphics.

The printer comes with an interface cable, a power cord with a 9-volt transformer, and a roll of paper. You can buy either a non-battery version Hush 80 or one with built-in NiCads for $40 more.

The printer's on/off switch is on the left-hand side of the unit, with the power cord socket inconveniently located underneath. The line-feed button is on the top right-hand side of the printer.

At first, I couldn't find the Hush 80's DIP switches to adjust line feed, and the manual didn't mention them. I called the company and they helped me find the switches (hidden under the printer's casing.) Ergo Systems has since moved the switches to underneath the front panel and the manual now explains how to set them.

Hush 80's features and price (half the price of the ThinPrint) make it a worthwhile buy.

The ThinType 80

If you need to print letter-quality documents on the road, the ThinType 80 is a good choice. Its printout is like that of a typewriter and it uses regular, single-sheet paper. But you pay for the quality: The ThinType is noticeably slower, heavier, and louder than the thermal printers.

The ThinType comes with internal rechargeable batteries, an internal ac adapter/charger, and a cable. It prints about 10 pages per charge and recharges in two hours. To help save battery time, the printer shuts off automatically if you don't use it within two minutes. You can order an external battery pack ($79.95) and a dc car adapter ($69.95), too.

The ThinType has a spin-wheel print head comprising five smaller wheels. The ink comes in an ink roll that's easy to replace and prints over 2 million characters.

The ThinType has two sets of power switches and indicator lamps. The ac switch is on the left, the dc on the right. The auto line-feed switch is located below the ac power switch. The printer cable goes into the back of the printer.

I had some problems getting the line feed to work correctly but after some trial and error, I managed to get it right. The ThinType 80's price and noise will make some people balk, but its print quality might override its drawbacks.■

Specification		ThinPrint 80	Hush 80	ThinType 80
Price		$339	$159.99	$429
Dimensions (in.):	Width	11.5	11.6	11.7
	Depth	7.5	5.5	7.8
	Height	2.5	2.8	2.5
Weight (lbs.)*		4.25	3	7.5
Roll Paper		Yes	Yes	No
Single Sheet		No	No	Yes
Speed (cps)		40	80	15
Battery		Yes	Optional	Yes
AC		Internal	9 volt	Internal
Serial		Yes	Yes	Yes
Parallel		Yes	Yes	Yes
Self-test		Yes	Yes	No
Print type		Dot-matrix	Dot-matrix	Impact
Characters supported		95 ASCII	129 ASCII	96 ASCII
International characters		No	Yes	No
Characters/line		80	80	80
Character modes:				
Condensed		Yes	Yes	No
Expanded		No	Yes	No
Emphasized		No	No	No
Inversed		No	Yes	No
Underline		No	No	No
Tab		No	Yes	No
Bit graphic		Yes	Yes	No

*Weight includes batteries

Table 4. Portable printer specifications.

A Window On the CP/M World

by John B. Harrell III

★★★★★

Monte's Window runs on the Model 4/4P (128K) and requires Montezuma Micro CP/M 2.2 version 2.2X. Montezuma Micro, CP/M Support Division, P.O. Box 32027, Dallas, TX 75232. $49.

Easy to use: ★★★★★
Good docs: ★★★★★
Bug free: ★★★★★
Does the job: ★★★★★

Monte's Window is a valuable addition to any Model 4/4P owner with 128K who uses Montezuma Micro's CP/M. Like Borland International's famous SideKick package, Monte's Window gives you access to a single-screen note pad, calendar, calculator, index card file, and CP/M system functions at any time, even when you're working in another application.

Inside the Window

You activate Monte's Window by pressing both shift keys at once. You can call up a window any time, except with a CP/M system function active.

When you invoke a window, Monte's Window saves the current contents of the video screen, including the cursor location and screen information, in reverse video. When you exit a window (by pressing the control-C), the program restores your applications screen and your previous cursor location.

The note pad displays a single screen of data that you can edit, print out, or move to or from a disk. One notable option lets you copy your current screen to the note pad so you can manipulate it with Notepad commands.

Notepad's editor is a simple one, lacking many of the features of a full-fledged text processor, like an insert capability and search and replace. You can, however, clear the entire note pad and select reverse or normal video modes for it.

The text file Notepad creates measures 24 lines by 80 characters and terminates lines with end-of-line markers. If you call up a text file you created with another program and use it with Notepad, Monte's Window may wreak havoc with its format.

The calendar accurately displays any month in the years from 1700 to 2200. You can move forward or backward in time by month or year using commands displayed on-screen. You can also copy the calendar to the note pad to print it out.

Before Monte's Window displays a month, it scans the index card file for date-specific notations (meetings, appoint-

Continued on p. 113

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Learning to Love Model 4 Basic

When Tandy introduced the Model 4, many users who cut their teeth on Level II and Model III ROM Basic doubted that the 4's RAM-based Basic was anything but a giant step backward. You had to separate key words with spaces, you had no single-key editing commands, and you had fewer than 30K of free memory with which to work.

But first impressions aren't always good ones. After using the 4P, TRSDOS 6.X.X, and Model 4 Basic for over a year, I can say without reservation that this Basic is second to no other 8-bit version.

Let me explain what I've learned. I'll start by discussing how to get around Basic's limited memory, then look at Model 4 Basic's new and enhanced commands and functions.

Gimme Some Space, Man

Model 4 Basic lets you use variable names of up to 40 significant characters, and the names can include embedded key words. Thus, GRANDTOTAL, COMPANY.NAME$, and COMPANY.ADDR$ are all legitimate (the periods in the last two are undocumented but valid characters).

You pay a price for this versatility—you have to use spaces to delimit your key words. This, along with the longer variable names, means that you use more memory. But you'll find that in a year (or even in a week) your code will be easier to modify and maintain. For example, a line like this one requires no Remark statementa to explain its logic:

```
10 IF SALES>BONUS.MIN THEN
   BONUS.AMT=SALES*.05
```

If you write a long program, or one that needs lots of memory for variable storage, you might have to break it up into modules. Fortunately, this is easy, since Model 4 Basic includes complete and simple program chaining facilities. You can pass any or all variables and file buffer descriptions to another program, and use the Merge option to integrate code with a program in memory.

Program Listing 1 uses Model 4 Basic's chaining capabilities in a menu sequencing program, one that can pass control and preset constants or open files to either a submenu or a processing program. Program Listing 2 shows a portion of a sample processing module, ENDDAY/MRG.

Lines 1000–59999 in the MAINMENU segment define the number of menu selections, the menu page title, and the selections proper. You would model subsequent submenus after these lines. The user function FNINV$(X$), defined in line 20, adds the leading and trailing video control codes needed for inverse video to Ita argument X$. A While. . .Wend loop validates the selection, after which line 150 chains in the proper file (menu or process) for the selected function.

You can follow the implementation of the Chain command in line 150 as follows. First, the program specifies the Merge option. Basic reads program lines contained in the ASCII file MRG.PRG$(n) from disk, encodes them, and then inserts them into the source code already in memory. This insertion follows the same rules as those used when you're writing a program: Basic will insert a line that does not exist and overwrites a line that does exist. The program starts with line 1000 of MRG.PRG$(n), and passes all variables to the new program.

The Delete command specifies that Basic should delete lines 1000–59999 in the original program before it merges the new code. Both the start and end lines used as argumenis for Delete must exist or you'll get an error; thus, the REM statement in line 59999 is only a place holder.

The ENDDAY/MRG module shows how Basic would break the menu loop (line 1000) for actual data processing. Another command (Chain or, at this point, Run) would return to the main menu.

The Erase command (line 30 in Listing 1) completely removes an array from memory as though you had never dimensioned it. Consider a sort routine that builds an index array from a direct- (new word for "random-") access file, sorts it, and then writes the array to an index file. You no longer need the index array left in memory, which can now limit the size of any new arrays and precipitate more frequent and time-consuming garbage collection. The simple command ERASE TMP.SORT$ eliminates these nasty possibilities. One caveat—any array you want erased must exist or you'll get an error. You can use the Common statement in lieu of the All parameter in the Chain command. Basic passes only variables specified as its arguments to a chained program. This requires you to plan more carefully, but it does use memory most efficiently.

Some programmers are confused about the Common statement's function in a program to which they're chaining another. Common's only action is to pass variables to the chained program. Common in a chained program specifies variables you want to pass to subsequent code, and you don't need it to receive the first program's variables.

Quiz Time

Now that you know all about program chaining, here's a challenge for you. Using Alan Smith's Model 4 machine-language sort routine from the March 1985 *80 Micro* ("A Sort Story," p. 70), write a chainable sort routine that receives the sort array from your program and passes the sorted array back to the calling program (or on to another for further processing).

Here are some hints. In the calling program, include these lines:

```
COMMON SORT4ARRAY$(),ARRAY.SIZE%,
  NEXT.PROG$,START.LINE%
CHAIN "SORT4/BAS"
```

In the sort program, include these lines:

```
COMMON SORT4ARRAY$(), ARRAY.SIZE%
CHAIN NEXT.PROG$,START.LINE%
```

Notice that I specified the execution line for NEXT.PROG$ as a variable (START.LINE%). You can do this, too, but the program must declare the variable used as an integer value, either with DEFINT or by

LOAD 80

System Requirements

Model 4/4P
64K RAM
Basic

Photograph by White/Packert Photography Calligraphy by Helen Merena

If you haven't yet warmed up to TRSDOS 6.X.X Basic, read on. Clifford I. Knight shows you how it offers improvements in program structure and execution speed over Model I/III Basic.

Program Listing 1. MAINMENU/BAS.

```
1   ' *** MAINMENU/BAS ***
10 CLS:DEFINT A-Z:DIM MRG.PRG$(1)
20 DEF FNINV$(X$)=CHR$(16)+X$+CHR$(17)
30 CLS:ERASE MRG.PRG$:RESTORE 59000
40 READ MAX.SLCT:DIM MRG.PRG$(MAX.SLCT)
50 READ TITLE$:PRINT TAB(40-LEN(TITLE$)/2);TITLE$
60 PRINT:PRINT:CTR=0
70 WHILE CTR<MAX.SLCT
80    CTR=CTR+1:READ MRG.PRG$(CTR)
90    PRINT SPC(20);FNINV$(STR$(CTR)+" ");" - ";
100   READ SELCT$:PRINT SELCT$:PRINT
110 WEND:PRINT@(22,10),"Enter Selection... ";:I=0
120 WHILE I<1 OR I>MAX.SLCT
130   I=VAL(INPUT$(1))
140 WEND:CLS
150 CHAIN MERGE MRG.PRG$(I),1000,ALL,DELETE 1000-59999
999 ' *** MAIN/MRG *** - save in ASCII format
1000 GOTO 20   ' entry for a menu module
59000 DATA 3,"MAIN MENU - XYZ Company"
59010 DATA "OEMENU/MRG","Order Entry System Menu"
59020 DATA "INVMNU/MRG","Inventory Control System Menu"
59030 DATA "ENDDAY/MRG","Start End of Day Sequence"
59999 REM
```

End

Program Listing 2. ENDDAY/MRG.

```
1 ' *** ENDDAY/MRG *** - save in ASCII
1000 ' end of day code goes here
2000 '...
50000 CHAIN MERGE "MAIN/MRG",1000,ALL,DELETE 1000-59999
59999 REM
```

End

Program Listing 3. Input routine without While. . .Wend.

```
10 I$=INPUT$(1)
20 IF I$=CHR$(13) THEN GOTO ??? (70)
30 IF I$<" " THEN GOTO 10
40 IN.LIN$=IN.LIN$+I$
50 PRINT I$;
60 GOTO 10
70 '... code continues here
```

End

Program Listing 4. Input routine with While. . .Wend.

```
10 WHILE I$<>CHR$(13)
20   I$=INPUT$(1)
30  WHILE I$>=" "
40    IN.LIN$=IN.LIN$+I$
50    PRINT I$;
60    I$=""
70  WEND
80  WEND:I$=""
90  '... code continues here
```

End

using the type specifier "%." Unfortunately, you can't pass deletion line numbers as variables.

I'll leave the discussion of chaining with these additional points. First, contrary to what the Model 4 manual implies, when you're not using the merge option, you don't need to save the program you've chained in ASCII format.

Second, when you use the merge option, you can't necessarily preserve user-defined functions. Basic stores and references user functions at their original location in the source code. Should the delete option remove the line containing the function definition, or if a merged program overwrites the definition line, that function ceases to exist and you'll get an error condition.

While. . .Wend

Listing 1 uses While. . .Wend, a structured programming technique long available in other languages. It doesn't do anything you can't do in Model III Basic, but it lets you write code that's easier to maintain.

Examine the input routines in Program Listings 3 and 4. In the first example, I had to complete the GOTO in line 20 after writing the code. Using While..Wend in Listing 4, I didn't. When you use a While. . .Wend loop, something must alter the value of the control variable (I$ in Listing 4), or the program won't break the loop. Line 60 does this by assigning the null string to I$. In line 80, Basic again clears I$ so that the program can reenter the routine. You can nest While. . .Wend loops (one inside the other as shown in Listing 4) to any number of levels.

I used Basic's new input function, INPUT$, in Listings 3 and 4. It replaces INKEY$; for example, the Model III code in Listing 3 might be 10 I$=INKEY$:IF I$="" THEN 10. The syntax is INPUT$(n,b), where "n" is the number of characters (no more, no less) from a file assigned to buffer "b" or from the keyboard if you don't specify a buffer. Model 4 Basic doesn't echo keyboard input to the screen.

It Takes Coordination

Microsoft altered the Model 4's PRINT@ function so you can specify screen locations as row and column coordinates; the syntax is PRINT@(r,c). This is an easier way than that Model III Basic uses to set up display positions.

You can still specify PRINT@ locations as an offset from the start of video memory, which has an advantage: You can store calculated or premapped cursor locations in single-integer variables (with a value of zero to 1919) instead of two-integer variables needed to store row/column designators.

New also is the ROW(x) function,

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Program Listing 5. Error-handling routine.

```
10 WARN1$="<ENTER>":WARN2$=SPACE$(7)
60000 PRINT@(23,5),"INVALID Entry!!! - Hit ";
60010 CSR=ROW(X)*80+POS(X)-1
60020 PRINT "<ENTER> to continue... ";
60030 WHILE INKEY$<>CHR$(13)
60040 WHILE TMR<>VAL(RIGHT$(TIME$,1))
60050 TMR=VAL(RIGHT$(TIME$,1))
60060 SWAP WARN1$,WARN2$
60070 PRINT@CSR,WARN1$;
60080 SOUND 3,0
60090 WEND
60100 WEND:RETURN
```

End

Program Listing 6. Clock display and CAPS lock toggle.

```
10 CLS:GOSUB 60000
20 CAP.PTR%=10*256+2^5
22 'flags+10, bit 5 = CAPS lock
30 CLK.PTR%=21*256+2^4
32 'flags+21, bit 4 = Clock ON/OFF
40 DEF FNTGL%(X%)=PEEK(FLAGS%+X%56) XOR (X% MOD 256)
100 INPUT "Type your name ";N$
110 POKE (FLAGS%+CLK.PTR%56),FNTGL%(CLK.PTR%)
120 PRINT "Clock ON"
130 POKE (FLAGS%+CAP.PTR%56),FNTGL%(CAP.PTR%)
140 INPUT "Type it again ";N$
150 POKE (FLAGS%+CLK.PTR%56),FNTGL%(CLK.PTR%)
200 PRINT "Clock OFF":END
60000 FOR J%=1 TO 6:READ USER%(J%):NEXT
60010 FLAGS%=0:GET.FLG%=VARPTR(USER%(1))
60020 CALL GET.FLG% (FLAGS%):RETURN
60100 DATA 16101,-4251,-6659,-7743,9073,-13968
```

End

which returns the current cursor row number (zero to 23). You can use Row with the familiar POS(x) to get the cursor's row/column coordinates. A slight problem with POS is that it returns a value of 1–80; PRINT@ positions are specified as zero to 79.

Many Basic commands (such as Row and POS) require a dummy argument; for example, the "x" in the above examples. This satisfies Basic's function interpretation routine's syntax requirements. They are place-holders, preventing the parsing routine from labeling a function with no argument as a syntax error.

Swap (SWAP v1,v2) is a useful new command that, as it's name implies, interchanges the values of its arguments. The parameters must be variables, not constants, and must be identical types. An obvious use of Swap would be in a Basic sort routine. You can also use it to toggle a string or numeric variable between two possible values, as you'll see in an example to follow.

Internal string manipulation has been greatly streamlined in the new Basic through the use of dynamic string memory allocation and improved assignment techniques. No longer do you need to reserve string storage space with the Clear statement, which is now modified to set Basic's top-of-memory pointer. You can use a second Clear argument to set Basic's stack size. You would need this only in extraordinary program situations. Clear alone resets all variables as it does in Model III Basic.

Microsoft modified FRE(x$) to return the amount of free memory, the same as MEM does. With dynamic string space allocation, its old Model III function becomes meaningless in Model 4 Basic. The Model 4 manual states that you can have a dummy parameter of any type and that executing this function forces garbage collection and returns the amount of free memory. In fact, garbage collection occurs only if you use a string variable as the dummy.

Frequent use of FRE can minimize the delays of garbage collection by reducing the number of orphaned strings at each purge. You'll notice the FRE delay least if you use it immediately after displaying a screen of data, or just after an input prompt when the user is busy reading or formulating a response.

Restore(n) has been modified to let you reuse the data in a specific line of code. This is an improvement over previous Basics, in which Restore reestablishes access to all data.

Sound (SOUND t,d) is a new Model 4 Basic command. The function generates a tone of frequency "t" and duration "d" via the 4's internal speaker. This is a tone more suited to games and as an alarm than for music.

The Model 4 interpreter offers a new output command, WRITE# (WRITE# b,data. . .), to output to the file associated with buffer "b" the data contained in a data list, properly delimited with commas and quotes as sequential files require. If you don't specify "#" and buffer number "b," Write sends data to the screen, a useful debugging aid, since you'll see even a string of spaces (or leading/trailing spaces).

Microsoft replaced the Model III TIME$ function with DATE$ and TIME$. You thus no longer need the cumbersome LEFT$(TIME$,8) and RIGHT$(TIME$,8) commands to separate the date and time.

Other "convenience" commands include Option Base and SPACE$. The first lets you specify either subscript zero or 1 to describe the first element of an array. By specifying a base option of 1, the element subscripts of an array will correspond to the record numbers of a direct-access disk file.

SPACE$ (SPACE$(n)) builds a string of "n" spaces in the same manner as STRING$(n,32). A related command, SPC(n), is similar to TAB(n) except that it moves the print position to the current column plus "n" spaces. Tab moves to absolute column "n."

You can convert numeric values to hexadecimal (base 16) or octal (base 8) string representations with HEX$(n) and OCT$(n). If you program in Assembly language, you'll appreciate the HEX$ function; otherwise, you might never need it.

Program Listing 5 is a simple error-message-handling routine using some of the new commands and functions discussed.

The program enters the subroutine at line 60000. The subroutine prints the first portion of the error message and then calculates the cursor position for the blinking message (line 60010). By repeatedly setting the variable TMR equal to the seconds counter of TIME$, the While..Wend loop toggles WARN1$ and WARN2$ to blink the message once per second. SOUND 3,0 in line 60080 alerts the operator.

What Else Is New?

Model 4 Basic incorporates a new method of interfacing to machine-language routines. Unlike the USRn statement of the Model III, the Call statement (CALL a(v1,v2,v3,. . .)) lets you pass more

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than one parameter to (and from) user routines. When the program enters your Assembly-language subroutine at address "a," the HL and DE registers will hold the VARPTR addresses of variables used as parameters 1 and 2 in the Call statement. If you specified only three parameters, BC holds the VARPTR value for parameter 3. If you're passing more than three values, BC points to a table of VARPTRs for the remaining parameters. If your machine-language routine saves these pointers, you can pass data back to Basic by stuffing the proper information into the pointers.

An example of multiple value passing could easily take all the space I have here, but I'll use Call in an example later to receive an integer value.

The old Renumber command Name now renames files from Basic. The RENUM command renumbers Basic source code. All line references in GOTOs and GOSUBs are renumbered, but you can't renumber a block of lines in the middle of a program.

"WIDTH [LPRINT] n" lets you set the line width of either the video display or printer output (if you use the LPRINT option). I can't see a use for the latter; the forms filter does this and more. Nor can I see much use for its video function. But it's there, so I thought I'd mention it.

Another new command, Wait, suspends program execution until Basic inputs a specific bit pattern from whichever one of the Z80's 256 input ports you specify. This is a convenience command; it does nothing that you can't do with a While. . .Wend loop and the INP(n) function. I took a quick look at the Model 4's port assignments and can't see any use for this in a standard system.

LPOS(x) returns the column number coinciding with where Basic expects your printer will print the next character. I say "expects," because Basic has counted each character sent to the printer since the last carriage return to arrive at this value. Many characters output to a printer directly control print head movement, but Basic counts each as a single character. Keep this in mind if you use this function.

The ERRS$ function returns a string containing the error number and a descriptive message.

You won't find the Level II and Model III CMD functions in Model 4 Basic, but you can duplicate most of them fairly easily. I've already mentioned the sort routine published in *80 Micro* to take the place of CMD"O". CMD"X", the cross reference function, is not available and sorely missed by some programmers. *(80 Micro has a Model 4 cross-reference program slated for publication later this year.—Eds.)*

Model 4 Basic has a function, ERRS$, that is similar to CMD"E". It returns a string containing the error number and a descriptive message. TRSDOS's error messages are often more informative than Basic's; for instance, should you attempt to access a drive without a disk, Basic gives you a "Bad file name" error, while the DOS gives you "Drive not ready."

You can duplicate CMD"R" and CMD"T"'s control of the clock display with SYSTEM "TIME(CLOCK=Y)". Unfortunately, the DOS Time command displays the time and a carriage return at the last cursor position, marring the display. The routine in Program Listing 6 overcomes this problem by loading and executing a 12-byte machine-language subroutine that puts the address of the DOS's system flag's storage area into the variable FLAGS%. From this base address, the 4 calculates two pointers, one to the keyboard flag byte (CAP.PTR%) and another to the display status byte (CLK.PTR%). By POKEing values obtained from a user functon FNTGL%, you can toggle both the clock display and the CAPS lock on or off.

This routine also introduces two new arithmetic operators and one new logical operator. MOD provides the modulus function; X MOD Y returns the remainder of X divided by Y.

The backslash character provides an integer division function; that is, X\Y yields the integer portion of the quotient.

In line 20, the integer variable CAP.PTR% has the offset from FLAGS% assigned to the high byte (10*256), and the bit number of the CAPS flag assigned to its low byte. The user function FNTGL% decodes this integer variable into the offset and bit number using the integer division and MOD operators.

The exclusive OR logical (XOR), a new logical operator, also appears in the user function, and toggles the flag bit.

Writing about Model 4 Basic's graphics commands is simple—there aren't any. Model 4 Basic doesn't include the Model III's Set, Reset, and Point commands. However, the Model 4 character generator can produce the same (modified somewhat for the new screen format) 64 graphics characters as the earlier machines, so by carefully building strings with CHR$(n) you can create graphics displays.

You can add Set, Reset, and Point with Mark Goodwin's machine-language subroutines published in the April 1984 issue of *80 Micro* ("Restored Art," p. 157) or

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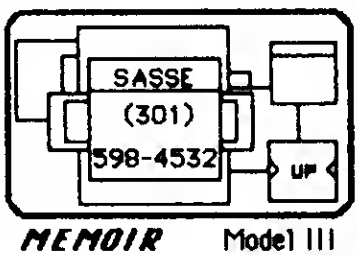

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with Alan Smith's Basic subroutine in this issue ("Upgraded Graphics," p. 76). If you're really into graphics, look up "Clear-Cut Trends" in the April 1985 issue (p. 40). It contains programs for the optional high-resolution video board with 640- by 240-pixel resolution.

Model 4 Basic includes many internal improvements to reduce source code length and increase execution speed. One such technique is a better way of storing numeric constants. When you type in a program, the computer converts numeric constants to the same packed format in which it stores variables as it encodes each line. To see what I mean, type in the following:

```
10 A = 123456
20 B = 1234567890123456
```

Now list it. See the "!" and "#" characters that the interpreter appended to your constants? A memory dump of this code shows that Basic stores the first constant in 5-byte single-precision format (1 byte less than the same code saved in ASCII) and that it stores the second value as an 8-byte double-precision value (saving 8 bytes). Since Basic doesn't have to decode constants each time the executing program meets one, the program runs faster.

Conclusions

Model 4 Basic is a big improvement over the earlier versions. The chain capability, in conjunction with Erase and the improved Restore statement, means that your programs' lengths are limited only by disk space. While. . .Wend removes the confusion of GOTO statements, and new techniques of dynamic string allocation and constant storage improve overall execution speed.

If you're an old Model I or III programmer who hasn't explored Model 4 Basic yet, get cracking—you'll soon give up your old ways. ■

Related Articles

Goodwin, Mark D. "Redevelopment Program." April 1984, p. 96. Program to convert Model III Basic programs to the Model 4.

Goodwin, Mark D. "Restored Art." April 1984, p. 157. Program to add Set, Reset, and Point to Model 4 Basic.

Graebner, Bruce A. and Jeffrey P. "Clear-Cut Trends." April 1985, p. 40. Business graphs for the III/4 hi-res board.

Smith, Alan D. "A Sort Story." March 1985, p. 70. A fast string sort for the Model 4.

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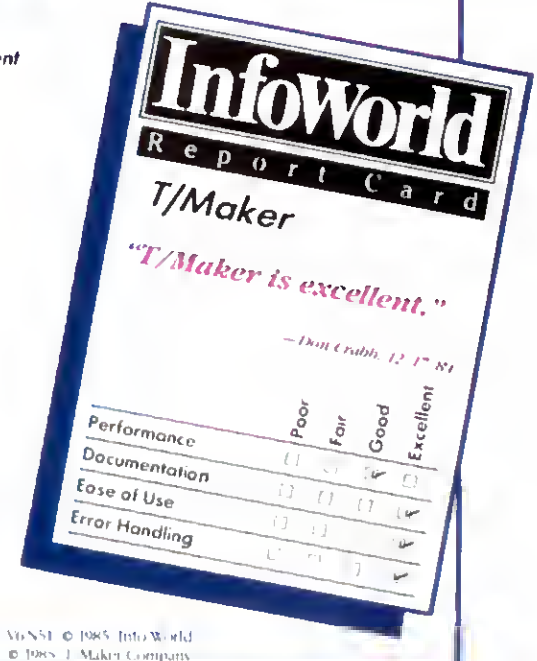

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Sifting Through GW-Basic

by Dave Rowell

A programmer's guide to the nuances of Model 1000 Basic.

I've been experimenting with the Tandy 1000 version of GW-Basic, and I'm pleased with the capabilities it offers. In particular, its event-trapping, graphics, and sound statements represent improvements over earlier versions of GW-Basic, even the Tandy 2000's. I'll discuss some of the new features in detail, using short programs to illustrate what you can do with them.

Besides these welcome enhancements, you'll find subtle functional changes in several familiar Basic statements, changes that can cause you frustration if

you're used to Model III/4 Basic. I'll point out a few. GW-Basic also lacks some Model III features you'll miss, like CMD"" and your favorite system POKEs.

Some Pitfalls

Before I get to the new stuff, I'll discuss some snags you might encounter if you're an old Model III Basic programmer. Like Model 4 Basic, GW requires that you accompany each If statement with a Then statement except with GOTOs. And you can't have Next statements in conditional phrases, like this:

```
90 REM ** The Model III way
100 IF A > 550 THEN FL = 1 : NEXT ELSE
  FL=0
110 PRINT "The line above causes a syntax er-
  ror in GW."
120 NEXT
```

Instead, replace Next with a GOTO pointing to the one Next statement allowed each For:

```
90 REM ** The GW equivalent
100 IF A > 550 THEN FL = 1 : GOTO 120 ELSE
  FL = 0
110 PRINT "One and only one Next for each
  For"
120 NEXT
```

Model III Basic executes any For...Next loop at least once. Model 4 Basic and GW-Basic skip over a loop if the counter will never enter the specified range, as is the case here:

```
100 FOR I = 1 TO 5 STEP - 1
110 PRINT "This will print once on a Model III."
120 PRINT "but never on a Model 4 or Tandy
  1000."
130 NEXT
```

Such a loop could result from using variables within the For range specifiers or in the Step statement. If you do use variables in the loop, and need it to execute at least once, examine your logic carefully.

If you nest For...Next loops (or GOSUBs) to the nth degree, your program might abort because it has run out of stack space. Fortunately, you can increase available stack space from the default (768 bytes or ⅛ of usable memory) with the Clear statement. Clear doesn't allocate string space on the Model 1000 as it does on the Model III; that's done dynamically. Clear also provides options for you to set aside space in high memory for machine-language subroutines or increase video storage space for the more greedy graphics modes.

Misunderstanding the Input statement can really cause problems. In Model III Basic, you can assign a default value to a variable, then let the program user change that value with an Input statement or leave it as is by pressing only the enter key:

```
100 X = 100 : PRINT "Correction factor is 100."
110 INPUT "Type in new value, or press enter
  to leave unchanged."; X
```

Do this on an MS-DOS machine and you'll get erroneous results in the calculations that follow. GW-Basic maliciously nulls variables if you press only the enter key in response to an Input prompt.

Here's a GW-Basic version of the Model III input routine above:

```
100 X = 100 : PRINT "Correction factor is 100."
110 INPUT "Type in new value, or press enter
  to leave unchanged."; X$
120 IF VAL(X$) = 0 AND X$ <> "0" AND X$
  <> "" THEN GOTO 110
130 IF X$ <> "" THEN X = VAL(X$)
```

Using a string instead of a numeric Input statement in line 110 lets the program determine if you input a zero or just pressed the enter key. Line 120 makes sure you've entered a number.

Random Rules

Microsoft tweaked GW's RND() function to make it predictable and repeatable, if you desire. If its argument is zero, RND repeats the pseudo-random number it generated previously. Any other argument, or no argument, produces a number between zero and 1 (the case in Model III Basic with an argument of zero).

The Model III RND() function can produce a random number between 1 and integer X if you use X as its argument. It's not that easy in GW-Basic:

```
10 P = INT(RND * X) + 1 'pseudo-random num-
  ber between 1 and X
```

If you write programs for several Tandy machines, the following algorithm gives you equivalent results on the Models I, III, 4, 1000, and 2000:

```
10 P = INT(RND(0.1) * X) + 1
```

The Models I and III truncate RND's argument to zero, the 4 rounds it, and MS-DOS machines accept it as nonzero, so all Basics produce a "random" number between 1 and X.

The Model III Random function reseeds the random number generator so that a program produces a different set of pseudo-random numbers each time you run it. The Randomize function is GW's replacement for Random, and it takes an argument, as in RANDOMIZE 232. To help in program testing, this function repeatedly produces the same series of random numbers for a given argument. To make a program generate a different set of numbers each time you run it, use the Timer function as an argument. Timer returns the number of seconds since midnight on the system clock:

```
10 RANDOMIZE TIMER      'Reseed with Timer
```

All Clear

MS-DOS machines have a 15-character type-ahead keyboard buffer. This is usually a convenience, but not when your program requires paging a series of text screens by key presses. A few misplaced keystrokes, or pressing a key long enough to start key repeat before the paging prompt appears, sends your information flashing past faster than you can speed-read.

You can avoid the problem by clearing the keyboard buffer before the input routine that starts each text page. Use an INKEY$ loop with 15 repetitions, or better yet, INKEY$ in a While...Wend loop. Here are examples of both methods:

```
100 FOR I = 1 TO 15 : X$ = INKEY$ : NEXT I
  'Clear buffer
110 PRINT "Press any key to see next page."
120 IF INKEY$ = "" THEN GOTO 120 'Wait for
  key press
130 REM ** Show next text page
```

```
100 WHILE INKEY$ <> "" : WEND      'Clear
  buffer
110 PRINT "Press key for next page."
120 WHILE INKEY$ = "" : WEND 'Wait for key
  press
130 REM ** Show next screen
```

On the IBM PC, you can POKE directly into the circular keyboard buffer, setting the input queue's tail and head to the same location. The DOS input routine then reads the buffer as empty, a trick that also works on highly IBM PC-compatible machines like the Tandy 1000. Replace line 100 in the above routine with:

```
100 DEF SEG = 0   'Set to bottom 64K segment
101 POKE 1050, PEEK(1052)    'Input queue
  head equals tail
102 DEF SEG  'Restore Basic memory segment
```

MS-DOS machines are faster than Z80-based micros; Basic on the 1000 runs about four times faster than on a Model III. If you use For...Next loops as time delay routines, you'll have to adjust your counter values accordingly.

More accurate than a For...Next Loop, and easier to set, is a subroutine containing GW-Basic's Timer function:

```
1010 REM ** Time delay subroutine: set
  TM = number of seconds before calling.
1020 TM1 = TIMER : TM2 = TIMER  'Initialize
  subroutine timers
1030 WHILE TM > TM2 - TM1  'Test elapsed
  time
1040 TM2 = TIMER                'Get current time
1050 WEND                       'End While loop
1060 RETURN
```

The subroutine stores the initial time when it enters the loop in TM1, then keeps sampling the present time until the number of seconds passed in variable TM has elapsed.

Miscellany

Several minor differences between Model III and GW-Basic are worth mentioning before I move on to GW's new features. The exponentiation sign is the caret symbol (shift-6), not the up arrow (printed as the left bracket).

Cassette commands no longer exist. GW functions that convert their arguments to integers round them to the nearest integer, like Model 4 Basic; they don't truncate them as does Model III Basic. And three functions, CINT, Fix, and INT, change real numbers to integer values. I have to look them up each time I use one. You'd better, too.

If you've done any GW-Basic programming at all, you know you must surround key words by spaces: DEF USR is two words. This increases program size. If you have a 128K 1000, believe it or not, you may find your programming space al-

3-D illustration by Phil Gerard/Photograph by Frank Condello

Program Listing 1. Example of the On Timer event trap.

```
10 ON TIMER(111) GOSUB 1000      'Every five saconds when active
.
.
100 TIMER ON                     'Activete timer event trapping
110 WHILE Inkey$ <> "" : WEND    'Cleer keyboard buffer
120 PRINT "Calculationa are complate. Check totale before continuing."
130 PRINT "Preaa Entar to atop beaping and continue."
140 WHILE Inkey$ = "" : WEND
150 TIMER OFF                    'Deactivata timer event trapping
160 REM  **  Whetaver comes next
.
500 END
.
1000 REM  **  Beeper subroutina
1010 BEEP                        '1/4 second 800 Hz tone 1020
RETURN
```

End

Program Listing 2. Hyperspace graphics program.

```
10 CLS : KEY ON : KEY OFF          'Turn off 25th line key diepley
20 CLEAR ,,,32768!                 'Modee 4--6 teke more RAM
30 SCREEN 5                        'Medium resolution, 16  colors
40 DEFINT A-R
50 DIM A(32)                       'To hold palette eesignmente
60 FOR I = 1 TO 32 : A(I) = (I MOD 15) + 1 : NEXT I
70 LINE (0,100)-(320,100),1 : LIRE (160,0)-(160,200),1
80 PRESET (160,100)                'Reeets to beckground (bleck)
90 FOR I = 10 TO 220 STEP 10
100 CLR = (I/10) MOD 14 + 1
110 CIRCLE (160,100),I,CLR,,,.6    'en ovel centered on ecreen
120 NEXT I
130 FOR I = 15 TO 1 ETEP-1
140 A1 = A(I):A(I)=0               'keep background bleck
150 PALETTE USING A(I)             'A() must be en integer errey
160 A(I) = A1                      'reetore A(I)
170 NEXT I
180 GOTO 130 'Loop until Breek
```

End

Program Listing 3. Using the Draw statement with a string argument.

```
100 CLS : KEY ON : KEY OFF
110 CLEAR ,,,32768!                '32K of your RAM for grephics
120 SCREEN 6                       'Hi-res, 4 colors
130 ON KEY(1) GOSUB 510
140 ON KEY(2) GOSUB 520
150 ON KEY(3) GOSUB 530
160 FOR I = 1 TO 3 : KEY(I) ON : NEXT I
170 ON KEY(11) GOSUB 540
180 ON KEY(12) GOSUB 550
190 ON KEY(13) GOSUB 560
200 ON KEY(14) GOSUB 570
210 OR KEY(15) GOSUB 580
220 ON KEY(16) GOSUB 590
230 FOR I = 11 TO 16 : KEY(I) ON : NEXT I
240 D$ = "M320,100"                'Move to center screen
250 X = POINT(0) : Y = POINT(1)    'Get location of lest point
260 IF X < 0 THEN D$ = "R1"        'Reveree direction if off-screen
270 IF X > 639 TBEN D$ = "L1"
280 IF Y < 0 THEN D$ = "D1"
290 IF Y > 199 THEN D$ = "U1"      'Stey ebove 25th line
300 DR$ = CL$ + D$                 'Combine color end direction
310 DRAW DR$
320 GOTO 250
500 REM  **  Subroutines
510 CL$ = "C1" : RETURN            'Set color
520 CL$ = "C2" : RETURN
530 CL$ = "C3" : RETURN
540 CLS : RETURN
550 GOSUB 540 : SCREEN 0,0,0 : WIDTH 80 : END  'Cls then reset screen
560 D$ = "U1" : RETURN             'Set direction to move one point
570 D$ = "L1" : RETURN
580 D$ = "R1" : RETURN
590 D$ = "D1" : RETURN
```

End

Program Listing 4. Spiral graphics program using the Draw statement.

```
10 REM  **  Drsw purple spirel
20 CLS : CLEAR ,,,32768! : SCREEN 6
30 B = .1 : C = 1.01
40 B = B*C+1: A = B MOD 360
50 IF B > 6000 THEN END
60 DR$ = "C2U1TA" + STR$(A)
70 DRAW DR$
80 GOTO 40
```

End

ready limited. Graphics memory takes at least 16K and Basic is in RAM, too. You can break up large programs and string the pieces together with the Chain and Common statements, but you should get a memory upgrade if you can afford it.

On Event-Trapping

Event-trapping is one of GW-Basic's fortes. In addition to the On Error trap found in Models III and 4 Basics, GW has traps for RS-232 input, light pen activity, joystick and mouse button presses, special key input, the condition of the music buffer, and a countdown timer.

Event-trapping lets you set up interrupt procedures for unpredictable events, then forget about them while your program does other things. When one of these events occurs, the program stops where it is, executes a subroutine set up for that event, and returns to what it was doing, without losing stride.

You can turn on or off, or temporarily suspend, trapping for a particular event. The Stop parameter suspends trapping during critical procedures, but keeps track of events and takes appropriate action when trapping resumes. Program Listing 1 is a demonstration of the On Timer event trap; I'll give examples of other event traps later on.

The syntax of event traps is fairly uniform. First you specify a subroutine with the On statement, as in line 10 of Listing 1. Trapping starts when an On statement executes (Line 100) and ends with an Off statement (Line 150).

The Timer trap's argument, 111 in this case, specifies a time period during which you have the event trap active. According to the manual, it should be 111 seconds, but I found that 111 produces a five-second period between traps. I programmed the On Timer() trap as a beeper. When it's active, the program drops to the Timer subroutine every five seconds, where it executes the Beep command. In the example, the beeper notifies you that a long processing task is finished and needs attention.

Display It Again, Sam

Screen display is where the TRSDOS Basic programmer will feel least at home. You can't POKE graphics characters to the screen easily with GW-Basic, but you shouldn't have to. Here's where you'll find the greatest number of new commands, commands that plot points and display text, change colors (up to 16) or graphics resolution (three levels), draw simple or complex shapes, even define the screen window's dimensions.

It's daunting to take all this in at first; however the examples that follow show not only how to use these features, but why you'd want to. The listings are short, and I suggest typing them in.

Hyperspace, Program Listing 2, is an entertainment program from the cheap

Continued on p. 53

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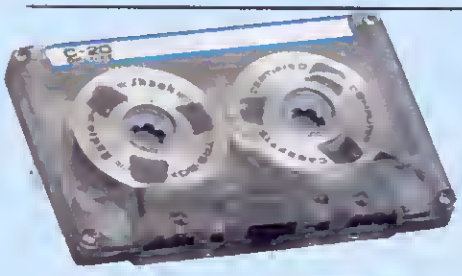

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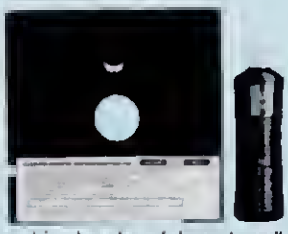

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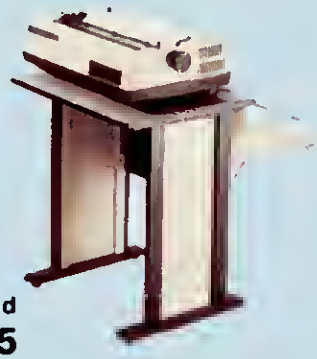

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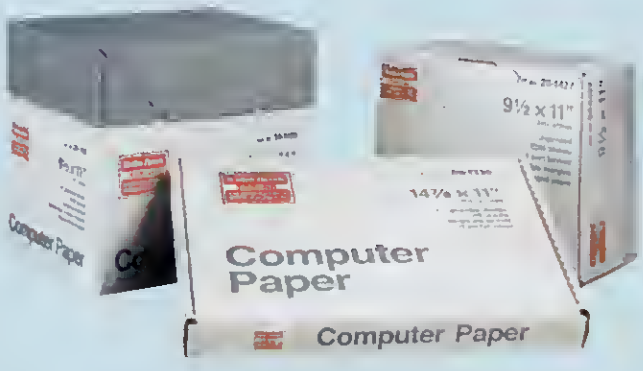

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thrills bin. It centers a group of concentric ovals on the screen using all 15 colors, then rapidly changes the color assignments to give the illusion of movement. It demonstrates the basics of using graphics commands, and also shows one of GW's more advanced features.

Start with the basics. Line 10 clears the screen, including the 25th line. The CLS command doesn't touch the 25th line, so as to leave intact the function key assignment display. You can't print text on that line, but you can put graphics there. Unfortunately, there's no simple way to clear graphics from the 25th line. The Key On : Key Off in line 10 flashes the key assignments momentarily. Your alternatives are to change to another screen mode and back with the Screen statement (jarring) or draw a filled black box in that area with the Line statement (slow).

The Screen statement in line 30 sets the display to mode 5 (medium resolution, 16 colors). Modes 4–6 require more RAM than the 16K default, so the Clear statement in line 20 sets aside the necessary 32K. The screen dimensions in medium resolution are 320 by 200 pixels, with the origin in the upper left-hand corner. Most graphics commands use this coordinate system.

The two Line statements in line 70 draw a vertical and a horizontal blue line centered on the display. The PRESET statement resets the center dot to black.

Lines 90–120 draw a series of concentric ovals centered on the screen with a For...Next loop that increases the radius l in the Circle statement by 10 each iteration. The variable CLR in line 100 cycles through all color values except black (1–15), so that each ellipse is a different color. The Circle statement's last parameter sets the aspect ratio of the ellipse; the default value, 1, makes a circle. You can draw large circles that only partially fit on the screen.

I've avoided mentioning the integer array A and the Palette Using statement, the trick that changes the colors via the loop in lines 130–180. When you specify a color for any of the graphics functions (e.g., the 1 in the Line statement), you're actually specifying the color assigned to the palette position with that number. A palette position's default color is its number: Palette position 1 is normally blue, color 1. You can change assigned colors with the Palette statement. The statement Palette 1,4 assigns red to palette position 1, and instantly changes any graphics in color 1 from blue to red.

The program's illusion of movement comes from sudden changes in color assignment, which the more powerful Palette Using statement accomplishes. You change all color assignments at once by specifying an integer array holding the new values. You specify an element in the array and the program assigns that value to palette position zero. The other palette colors are assigned sequentially from the array. In Listing 2, the array holds the colors 1–15 in sequential order twice (line 60).

Program Listing 5. Illustration of graphics windows.

```
10 KEY ON : KEY OFF
20 CLEAR ,,,32768! : SCREEN 6 : CLS
30 WINDOW (0,0)-(639,199)
40 GOSUB 100
50 VIEW (20,30)-(310,90),3,1
60 GOSUB 100
70 VIEW (280,80)-(380,150),1,2
80 GOSUB 100
90 END
100 FOR Y = 1 TO 198 : X = .1*Y^1.65
110 PSET (X,Y),2
120 NEXT Y
130 RETURN
```

End

Program Listing 6. Illustration of text windows.

```
10 SCREEN 0 : WIDTH 80 : CLS
20 VIEW PRINT 1 TO 7
30 FOR I = 1 TO 15
40 PRINT TAB(15) "View Print 1 To 7 Does the same"
50 PRINT TAB(16) "as Poke 16916,7 on the Model III."
60 NEXT I
100 VIEW PRINT 15 TO 24
110 FOR I = 1 TO 15
120 PRINT TAB(11) "But can you do this with Model III Basic?"
130 PRINT
140 NEXT I
150 VIEW PRINT              'Default is entire screen
```

End

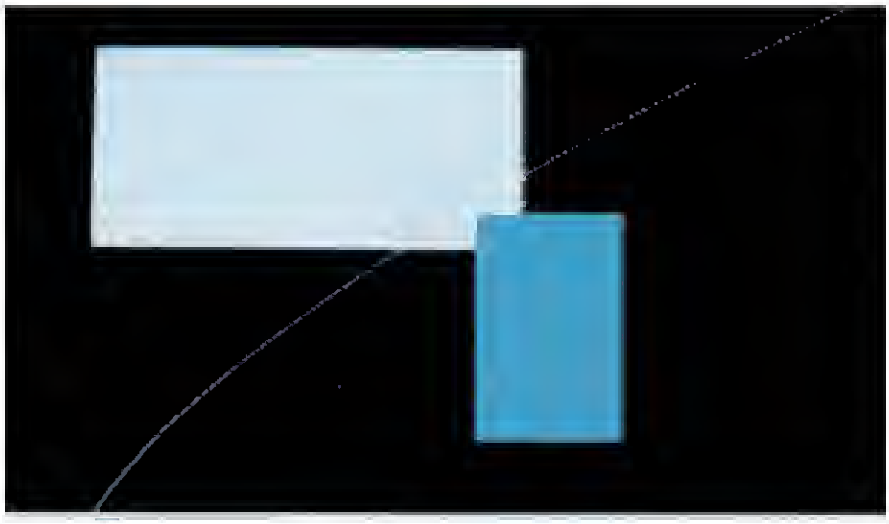

Photo. Screen windows using the Window and View statements.

The Palette Using statement cycles through this array in the loop in descending order, so the colored ellipses seem to move toward you. Line 140 temporarily keeps the color assigned to the background as black (color zero). Line 160 restores the array to its original condition.

Sketching Session

Perhaps GW-Basic's most sophisticated graphics feature is the Draw statement, which takes a string argument. In the string, you can specify a series of Logo-like cursor movement functions, or even refer to a substring that's defined to do something like draw a box. Program Listing 3, a screen sketch program, illustrates some of these abilities, and also uses event-trapping on the arrow and function keys. It runs in the high-resolution, four-color mode 6.

Most of the program sets up event-trapping for function keys 1–3 (lines 130–160), function keys 11 and 12 (lines 170 and 180), and the four arrow keys (lines 190–230). The loops in lines 160 and 230 turn on event-trapping for the keys once you assign them subroutines. After doing this, the program spends its time in the loop in lines 250–320, unless you press one of the trapped keys.

The central loop executes a Draw statement with argument DR$ (line 310) over and over. String DR$ has the initial value of "M320,100", a Move command that puts a dot at position 320,100, the screen's center.

Pressing one of the arrow keys shunts the program to the appropriate subrou-

tine, where it changes part of DR$ to a directional Move argument, either U1, D1, L1, or R1. These arguments specify one-increment moves, drawing as the cursor moves, either up, down, left, or right.

The subroutines return to the spot where the interrupt occurred. Once you press a directional arrow, the cursor never stops drawing; you just control the direction. Lines 250–290 check the cursor position (Point), and reverse direction if the cursor is going offscreen.

Function keys F1–F3 change the part of DR$ that determines the line's color. Screen mode 6 has four colors, one of which is black, the background. The argument "C1" sets the cursor color to 1, the default of which is cyan. F11 clears the screen, after which the cursor starts at midscreen, the Draw command's default.

F12 stops the program, calling on the CLS subroutine, then resetting the screen mode to zero and the screen width to 80 columns.

You can use Draw to create some shapes that you can't get with Circle or Line, or that you can't easily plot with a function. Program Listing 4 draws a purple spiral, like a Nautilus shell. The Draw command's argument sets the color (C2), moves up 1 (U1), then changes the direction of "up" in degrees. "TA180" would cause up to be down. Line 40 changes the angle with each move. If the angle changes by the same amount each time, you get a perfect circle. In this case, the amount of change increases slightly with each repetition, so the circle tightens into a spiral. The degree of spiral depends on the variable C's value.

Screen Windows

Even better than Draw are the View and Window statements, which let you define an active area of the screen and scale its dimensions. View defines a rectangular area of the screen, a viewport, to which it confines all graphics activity. Even the CLS statement clears only the viewport.

The Window statement lets you scale the current viewport's coordinate system. You can scale the screen to fit the range of values of the data you're graphing.

Program Listing 5 demonstrates the powers of View and Window. It defines a coordinate system and plots the same hyperbolic curve in three different-sized viewports using that coordinate system (see the Photo). Line 20 clears adequate graphics space in RAM, then sets hi-res mode 6.

The Window statement in line 30 defines the window as having the same coordinate dimensions it normally would have in mode 6. Since the Window statement has no Screen parameter, the X coordinate goes positive up, which is what you'd want for plotting mathematical functions. If you specify the Screen parameter, the X axis is positive down, as the screen coordinates usually are.

The subroutine plots a magenta curve from the origin in the lower left-hand cor-

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ner to the upper right-hand corner using the PSET statement. The program first plots the curve on the default viewport, the whole screen, then defines a second viewport in line 50.

Along with the coordinates that define size and location, I specified a white background with a cyan border for the second window. The white fills rather slowly and covers part of the first curve. If I hadn't specified a color, the background would stay black. The colored border is just thick enough to delineate a viewport from background of the same color, a nice touch. The third viewport is still smaller, and is cyan with a purple border.

Even though the three viewports have different proportions, the curve runs from one corner to the other. In one case the graph is flattened out; in another it's tall and skinny. By varying the parameters of the Window and View commands, you can play with a function curve's shape and proportions.

PSET and PRESET are the GW equivalents of Model III Basic's Set and Reset statements, dressed up to handle color. The GW Point command not only determines if you set a given coordinate, it also tells you the point's color, and you can use it to return the cursor's current position. In text mode only, you can use the Screen function to test a given screen position for the character there, or for color. Be aware that Reset in GW Basic performs the drastic task of closing all open disk files.

The View Print statement performs a similar windowing function with text. You can limit the active text screen to a range of screen rows, as you can by POKEing to 16916 on the Model III. Program Listing 6 is an example. Note this difference from the graphics window: a CLS command clears the whole screen, not just the window.

As impressive as GW-Basic is, it still could be easier to use. The graphics commands, in particular, are frustrating to learn. That's the price of complexity. But when you've set aside enough memory, used the right variable types, and figured what works in which mode, the result can be excellent. That's the reward of complexity.■

Dave Rowell is an 80 Micro technical editor who specializes in MS-DOS computers.

Related Articles

Heid, Jim, "The GW Difference," February 1985, p. 42. An introduction to GW-Basic that focuses on converting Model I/III/4 programs.

Lobdell, Gregory E., "A Better Breed of Basic," July 1984, p. 94. GW-Basic on the Tandy 2000.

Rowell, Dave, "The Tandy 1000 Tip Sheet," June 1985, p. 38. Helpful hints for Tandy 1000 owners including a section on GW-Basic.

Dueling Software

by Bradford N. Dixon
and Dave Rowell

This all started when 80 Micro technical editor Brad Dixon strolled over to colleague Dave Rowell's desk in the tech room and deliberately spilled coffee all over Rowell's DeskMate manual. Rowell slowly rose to his feet. He snatched the clip-on pen from Dixon's shirt pocket, threw it to the floor, and ground it under his heel. Before anyone could stop him, Dixon had picked up his softball glove and slapped Rowell's cheek with it. "You dare insult me," sneered Rowell, a cold, hard glitter in his eyes....

Of course, they had to fight a duel after that. Cruelly, Dixon proposed the most brutal of all blood sports—shopping. The challenge was to spend $1,000 on software for the Model 4 and $1,000 on Tandy 1000 software. The duellers would have to hunt mercilessly for bargains—each tapping his expertise in a particular machine—using every ounce of skill to find the most useful, highest-quality software for the money. Armed with hundred-dollar bills from a Monopoly game, Rowell and Dixon measured off 10 paces and the duel began. Here's what they bought.

Dixon's Picks

For me, the task of making a wish list of Model 4 software was pretty easy, since my background is with Tandy's Z80-based computers. The variety of good Model III/4 software for any application rivals that for any personal computer. The fact is, my $1,000 wasn't enough for everything I wanted. I managed to find 13 programs and spend $999.25 with no problem at all.

Buying MS-DOS software, however, was new to me. Like many TRS-80 owners, I haven't paid all that much attention to PC compatibles, except to envy the color and graphics capabilities of MS-DOS machines. I found fewer bargains for the 1000 software than for the Model 4—only nine programs for $994.95.

Model 4

Allwrite $199.95 from Prosoft, Box 560, N. Hollywood, CA 91603, 800-824-7888, oper. 422.
Manufacturer: Prosoft.

This isn't the least expensive Model 4 word processor around, but it is one of the most versatile. Word processing is the primary reason I use a computer, so buying a first-class program was the only way to go.

DotWriter 4.0 $69.95 from JMG Software International, 3235 Lockport Road, Niagara Falls, NY 14305, 416-575-2867.
Manufacturer: Prosoft (see address above).

To go along with Allwrite, I chose a printer driver program that matched my word processor in number of features. Changing fonts and print sizes isn't for everyone, but it can spruce up an otherwise ordinary letter.

Double Duty $69.95 from Tandy/Radio Shack, 1800 One Tandy Center, Fort Worth, TX 76102, 817-390-3011.
Manufacturer: Tandy/Radio Shack.

This well-regarded utility is one of three Radio Shack programs on the list; it lets you run two Model 4 applications simultaneously on a 128K system.

Two *80 Micro* editors go gunning for a high-caliber software library.

Microlink II $79 from B.T. Enterprises, 10 Carlough Road, Bohemia, NY 11716, 516-567-8155.
Manufacturer: B.T. Enterprises.

Microlink is the best terminal package I've found for the Model 4. It's easy to learn and use, and it takes advantage of Model 4 features in ways no rewritten Model III program does. I like it and use it.

Orchestra 90 $68 from Montezuma Micro, Redbird Airport, Hangar 18, P.O. Box 32027, Dallas, TX 75232, 214-339-5104.
Manufacturer: Tandy/Radio Shack (see address above).

I've heard demonstrations of this music program; one of the reasons I chose it was for its entertainment value. Another reason is the amount of free music available for it on BBS systems and from CompuServe's Orchestra 90 special-interest group.

PFS:File $107 from Montezuma Micro (see address above).
Manufacturer: Software Publishing Inc., 1901 Landings Drive, Mountain View, CA 94043.

I've found this data base manager simple to learn and flexible to apply.

Planetfall $34.50 from JMG Software International (see address above).
Manufacturer: Infocom Inc., 55 Wheeler St., Cambridge, MA 02138.

This is the only game on my Model 4 list. It may not be Infocom's most challenging adventure, but it does have the best sense of humor.

Supercross/XT and CNVBasic/CMD $119.95 from Powersoft, 17060 Dallas Parkway, Suite 114, Dallas TX 75248, 214-733-4475.
Manufacturer: Powersoft.

You can buy these two utilities separately or as a package. Supercross/XT is a file-transfer utility that lets your Model 4 read Tandy 1000 disks and copy programs to or from those disks. A companion program, CNVBasic/CMD converts Model I/III programs to MS-DOS, CP/M, or Model 4 format. Both programs come in handy when you're programming on more than one computer.

Super Utility Plus 3.2 $59.95 from AMI, 612 Washington, Denver, CO 80203, 800-468-4474.
Manufacturer: Powersoft (see address above).

No software wish list would be complete without Powersoft's Super U. You can use version 3.2 on Model III or 4 disks.

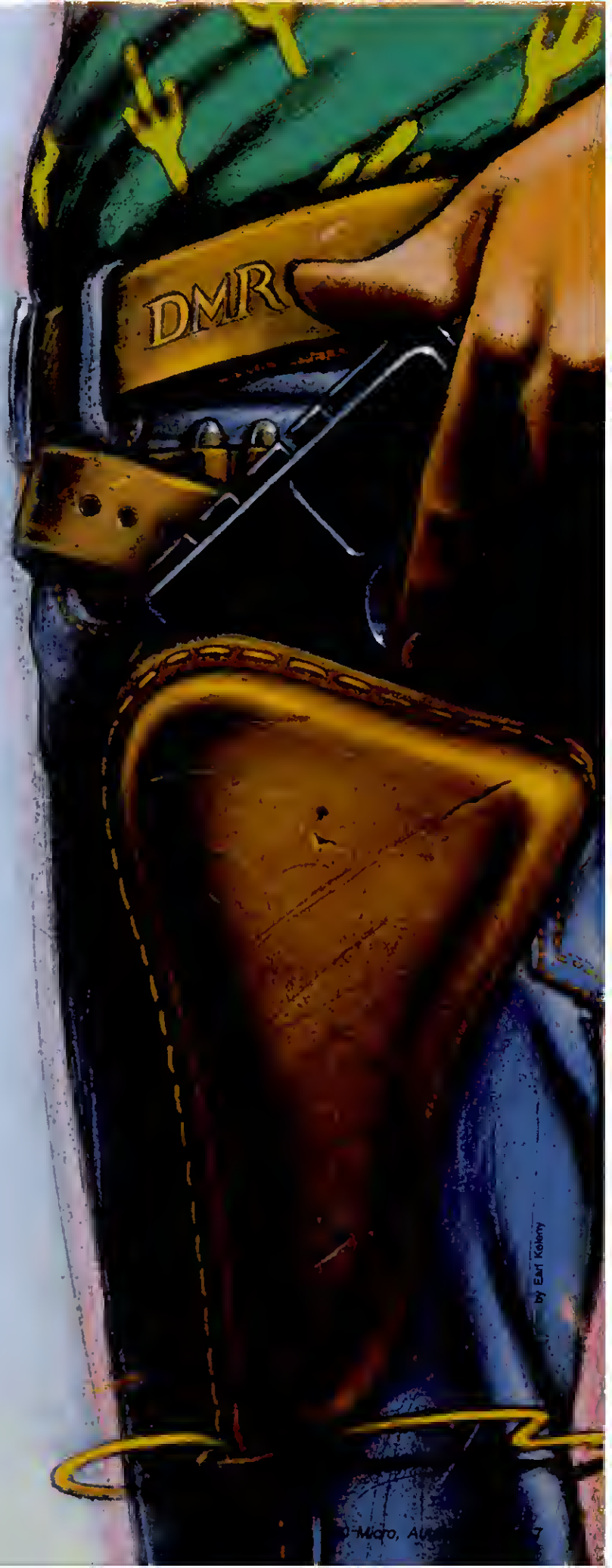
System Diagnostic $99.95 from Howe Software, 14 Lexington Road, New City, NY 10956, 914-634-1821.
Manufacturer: Howe Software.

System Diagnostic tells the Model 4 owner what's right and what's wrong with his computer, from disk drives to memory.

TRSDOS 1.3 $12 from Montezuma Micro (see address above).
Manufacturer: Tandy/Radio Shack (see address above).

Radio Shack's Model III operating system lets Model 4 owners tap the multitude of Model III software still available.

ZBasic 3.0 $79.50 from JMG Software International (see address above).



Manufacturer: Simutek Computer Products Inc., 4897 E. Speedway, Tucson, AZ 85712.

Machine-language programming isn't for everyone, but everyone wants the speed of machine language. This Basic compiler converts Basic files to /CMD files.

Tandy 1000

EZ-Dos-It $199.95 from Hammer Computer Systems, 700 Larkspur Landing Circle, Suite 285, Larkspur, CA 94939, 415-461-7633.
Manufacturer: Hammer Computer Products.

This program runs up to eight Model 1000 files concurrently without requiring a hardware modification. Using the control and function keys, you can simultaneously run all programs that can fit into the 1000's memory.

Flight Simulator $34 from Applied Computer Products, 1633 Republic Road, Huntington Valley, PA 19006, 215-322-6500.
Manufacturer: Microsoft, 10700 Northrup Way, Bellevue, WA 98004.

Microsoft's classic has to be a must for any MS-DOS library.

Gato $25 from Conroy-LaPointe, 12060 S.W. Garden Place, Portland, OR 97223, 800-547-1289.
Manufacturer: Spectrum Holobyte Inc., 1494 Greenbriar Blvd., Boulder, CO 80303.

This real-time submarine simulator is a challenge for players of any ability.

Microsoft Basic Compiler $229 from CompuClassics, 6934 Canby St., Suite 104, Reseda, CA 91335, 800-328-4473.
Manufacturer: Microsoft (see address above).

Microsoft's compiler speeds up those normally slow-running GW-Basic programs.

The Norton Utilities $48 from Computers Direct, 6232 Oakton St., Morton Grove, IL 60053, 800-848-0888.
Manufacturer: Peter Norton, 2210 Wilshire Blvd., Santa Monica, CA 90403.

Peter Norton's disk utility package is the Super U of the MS-DOS world. (At this writing, Powersoft was about to introduce its MS-DOS version of Super U.)

Sidekick $30 from PC Connection, 6 Mill St., Marlow, NH 03456, 800-243-8088.
Manufacturer: Borland International, 4113 Scotts Valley Drive, Scotts Valley, CA 95066.

A concurrent desktop utility. With only a few keystrokes, you can display all the information you need to keep things organized: a calculator, a notepad, an ASCII table, and more.

Supercalc III $219 from CompuClassics (see address above).
Manufacturer: Sorcim/IUS Micro Software, 2195 Fortune Drive, San Jose, CA 95131.

Supercalc III provides a better data base than DeskMate, along with the graphics l

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need to present data base or spreadsheet information. The price may be steep, but it's a program with applications beyond those I can list here.

ThinkTank $105 from Conroy-LaPointe (see address above).
Manufacturer: Living Videotext Inc., 1000 Elwell Court, Suite 232, Palo Alto, CA 94303.

An idea processor for writers who need to outline their thoughts.

Volkswriter $105 from Conroy-LaPointe (see address above).
Manufacturer: Life Tree Inc., 411 Pacific St., Monterey, CA 93940.

I found this popular word processor easy to use and flexible in handling printers and text-formatting commands.

DeskMate Free with a Tandy 1000.
Manufacturer: Tandy/Radio Shack (see address above).

I didn't include a terminal program in my list because DeskMate's is sufficient for me. The other utilities in the program no longer meet my needs, so I found more powerful programs.

Rowell's Choices

It was easier for me to come up with the Tandy 1000 list; I'm most familiar with MS-DOS computers. I'm a little less secure about my Model 4 choices.

The order of listing has some correlation with a program's importance for me. My listed prices usually don't include shipping, but I took shipping charges, or lack thereof, into account when comparison shopping.

I don't need a spreadsheet, so I didn't pick one for the Model 4. With the 1000, I can use DeskMate's. I suppose I could have fallen back on DeskMate for other types of software that I use rarely.

Once I made my Model 4 choices, it was easy to stay under $1,000. There's plenty of room for a few luxury items if you spend wisely. I found 16 Model 4 programs for $998. For the Tandy 1000, I got 12 programs for $981 (good luck finding an MS-DOS software product for the remaining $19). With the exception of the Borland International products and a few others, MS-DOS programs are pricier. I didn't have enough to buy a Basic compiler, for instance.

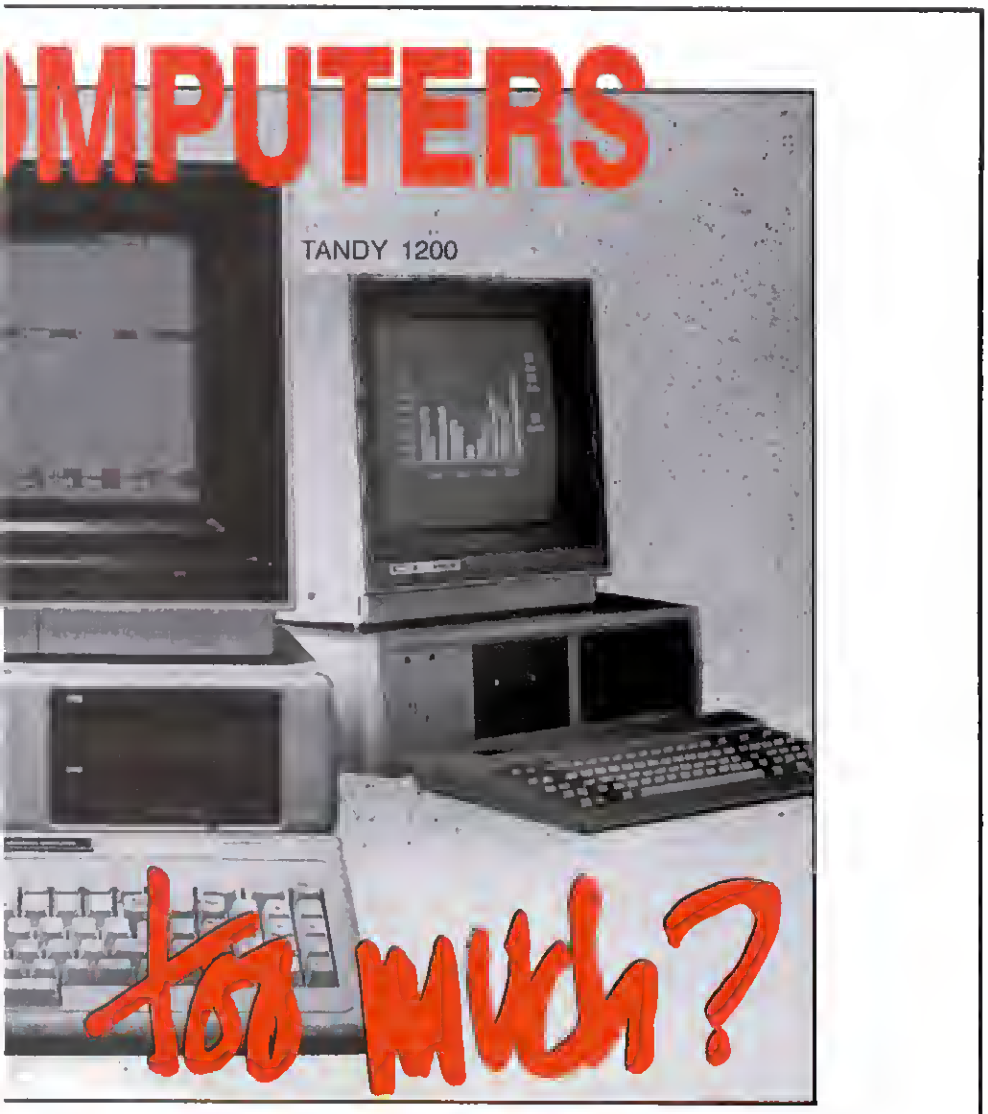
Model 4

Super Utility 4/4P $70 from Montezuma Micro (see address above).
Manufacturer: Powersoft (see address above).

This disk utility is, in a word, indispensable.

Scripsit $85 from Montezuma Micro (see address above).
Manufacturer: Tandy/Radio Shack (see address above).

The word processor I'm used to. A word processor is important to me, but I don't need lots of features. I'm going to soup up this one with the two add-ons below.



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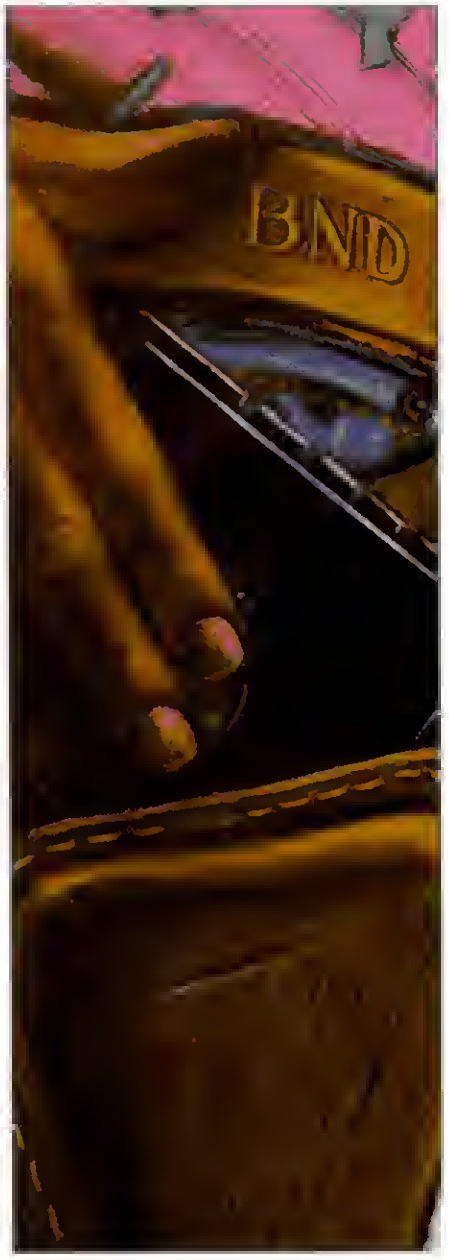


Powerscript $35 from DiskCount Data, 2701-C W. 15th St., Suite 612, Plano, TX 75075, 214-680-8268.
Manufacturer: Powersoft (see address above).

An enhancement package adding all the features of SuperScripsit except proportional spacing and a couple of others.

Powerdriver $30 from Powersoft (see address above).
Manufacturer: Powersoft.

In case I want to use a non-Tandy printer for fancy stuff.

Electric Webster $90 from Cornucopia Software, P.O. Box 6111, Albany, CA 94706, 415-524-8098.
Manufacturer: Cornucopia Software.

I've just discovered that spelling checkers are worth the money.

Zork II $40 from JMG Software International (see address above).
Manufacturer: Infocom Inc. (see address above).

For adventure games, I like Infocom.

M-ZAL Macro Assembler $80 from JMG Software International (see address above).
Manufacturer: Computer Applications Unlimited, P.O. Box 214, Rye, NY 10580.

I'm just getting started in machine-language programming. Hardin Brothers likes this one and the features seem right.

TRSDOS 1.3 $12 from Montezuma Micro (see address above).
Manufacturer: Tandy/Radio Shack (see address above).

A small price to pay for the option of running Model III software.

ZBasic 3.0 Basic Compiler $80 from JMG Software International (see address above).
Manufacturer: Simutek Computer Products Inc. (see address above).

For me, Z's overall features outweigh its lack of a chaining capability.

The Producer $200 from Producer Software, Box 1245, Arlington, TX 76004.
Manufacturer: Producer Software.

I don't need a data base, but I like playing with data bases anyway. It would be fun to design my own with this recommended program writer. The enjoyment would justify the program's high price for me.

Hypercross $50 from Hypersoft, P.O. Box 5115, Raleigh, NC 27609, 919-847-4779, 6–11 p.m.
Manufacturer: Hypersoft.

To transfer files from the Model III/4 to MS-DOS computers.

MTerm $60 from Design Software, Box 42847, Las Vegas, NV 89104, 800-622-4070.
Manufacturer: Micro-Systems Software Inc., 4301-18 Oak Circle, Boca Raton, FL 33431.

I don't telecommunicate much. I'm more likely to transfer files via a null modem. This terminal program looks as if it'll do the job at a reasonable price.

Disk Drive Analyzer $26 from Montezuma Micro (see address above).
Manufacturer: Tandy/Radio Shack (see address above).

Important with a Radio Shack computer, but not that important. As the ad says, "Why pay more?"

LS-Utility Disk $50 from Logical Systems Inc., 8970 N. 55th St., P.O. Box 23956, Milwaukee, WI 52332, 800-248-3535.
Manufacturer: Logical Systems.

A good bunch of utilities that Super U doesn't provide.

Double Duty $60 from Montezuma Micro (see address above).
Manufacturer: Tandy/Radio Shack (see address above).

This is a luxury, a gee-whiz program that's really handy from time to time. It does require a 128K machine.

Voyage of the Valkyrie $30 from DiskCount Data (see address above).
Manufacturer: Not available.

I had $32 of my $1,000 left and went for something frivolous.

Tandy 1000

Perfect Writer (with speller) $199 from Conroy-LaPointe Inc. (see address above).
Manufacturer: Thorn EMI Computer Software Inc., 3187 C Airway Ave., Costa Mesa, CA 92626.

This word processor has lots of features for the price, is easy to use, and has a speller. Doesn't tell you where you are in the document, though.

SideKick $30 from PC Connection (see address above).
Manufacturer: Borland International (see address above).

The desktop program of choice if you're a programmer, since it has an ASCII table and a calculator that works in hexadecimal and binary formats.

ThinkTank $99 from Northeastern Software, 88 Riders Lane, Stratford, CT 06497, 203-375-3860.
Manufacturer: Living Videotext Inc. (see address above).

An outlining program, and a good writer's crutch.

The Norton Utilities 3.0 $55 from Business Computers of Peterborough, NH, School St., Peterborough, NH 03458, 603-924-9406.
Manufacturer: Peter Norton (see address above).

Great for recovering data and exploring your disks. (There's a Super Utility for the 1000 in the works.)

Flight Simulator $32 from Northeastern Software (see address above).
Manufacturer: Microsoft (see address above).

A classic. More than a game, it shows what the 8088 can do.

MASM $65 from MC-P Applications, 1630 Oakland Road, Suite A114, San Jose, CA 95131, 408-293-3360.
Manufacturer: Microsoft (see address above).

The standard assembler for PC compatibles.

dBase II $249 from Northeastern Software (see address above).
Manufacturer: Ashton-Tate, 10150 W. Jefferson Blvd., Culver City, CA 90320.

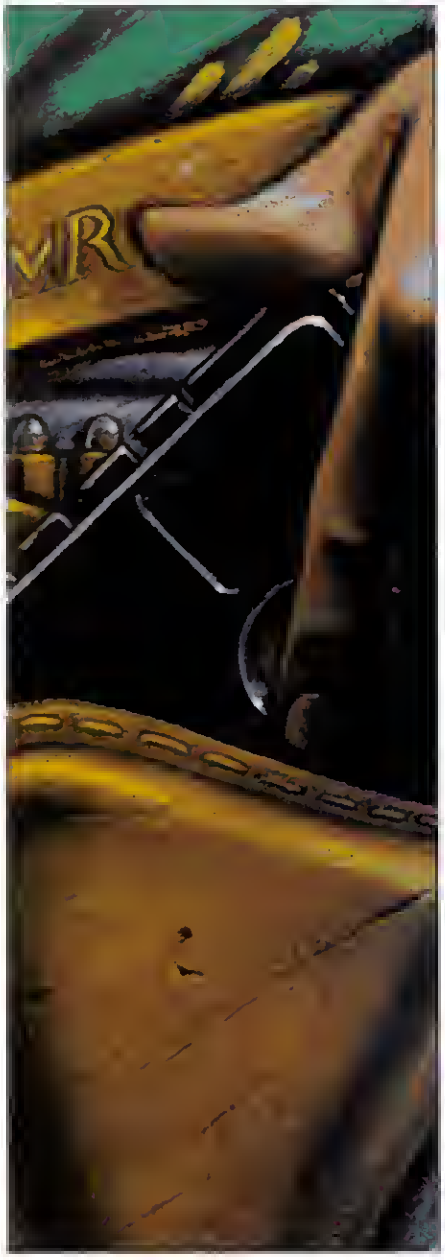
The well-known relational data base. Not easy to use, but powerful; I want to experiment with it.

Copy II PC $25 from Telasoft, 2222 E. Indian School Road, Phoenix, AZ 85016.
Manufacturer: Central Point Software Inc., 9700 S.W. Capitol Highway 100, Portland, OR 97219.

I promise I won't misuse it.

Turbo Pascal $30 from PC Connection (see address above).
Manufacturer: Borland International (see address above).
The cheap way to learn Pascal.

SmartCom II $89 from PC Connection (see address above).
Manufacturer: Hayes Microcomputer Products Inc., 5923 Peachtree Industrial Blvd., Norcross, GA 30092.



A reasonably priced terminal program.

Sorcerer $29 from PC Connection (see address above).
Manufacturer: Infocom Inc. (see address above).

One of my favorite adventure games. I got stuck in this one long ago.

Prokey 3.0 $79 from Warehouse Data Products, 2701 W. Glendale Ave., Suite 6, Phoenix AZ 85021, 602-246-2222.
Manufacturer: RoseSoft, 4710 University Way N.E., Seattle, WA 98105.

I haven't yet tried this keyboard macro definer on the 1000. It might help solve keyboard compatibility problems with other PC software.■

Bradford N. Dixon and Dave Rowell are on the 80 Micro staff.

Note: The software prices quoted here were current in April 1985, and may have changed since then.

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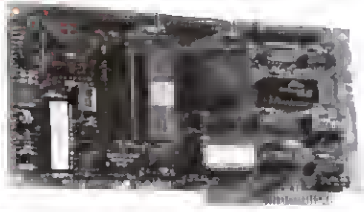

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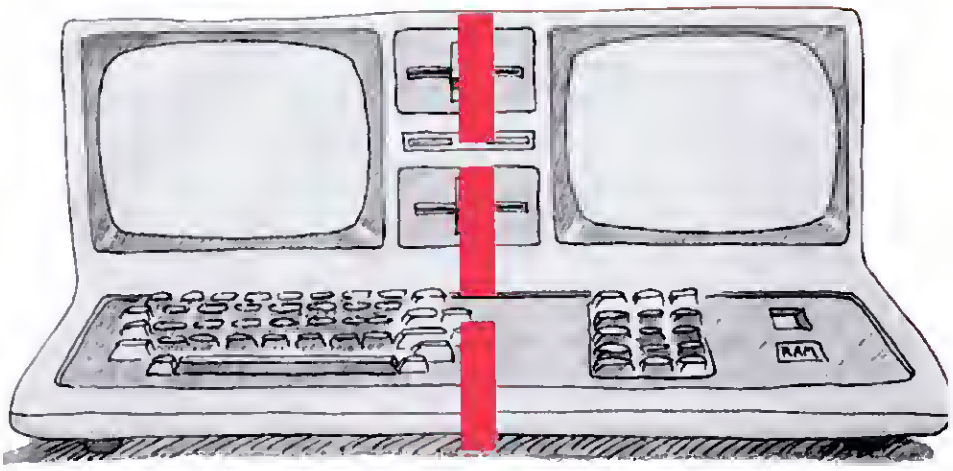

The Great Divide

by E. Cameron Snyder

Partition your 128K Model 4 so you can switch back and forth between two programs in Model III mode.

If you own a 128K Model 4 or 4P, chances are you've heard about Radio Shack's DoubleDuty utility, which splits your computer into independent partitions so you can switch between two Model 4 programs at will. But DoubleDuty works only with TRSDOS 6.X. Why waste your computer's extra memory and bank-switching feature when you run programs in Model III mode?

Times2 gives you DoubleDuty's capabilities for Model III programs by setting up two partitions operating under LDOS 5.1.X (see the Program Listing). You can load two Model III applications and switch back and forth between them, returning to each program just as you left it.

Even if you don't need double program operation, how many times have you been in the middle of a job and needed information from another program, or a simple directory listing. With Times2 installed, you can get that information and return with your job intact.

What You Get

Times2 is an interrupt routine that creates and switches between two partitions that function like two independent Model 4's in Model III mode. Unlike DoubleDuty, Times2 doesn't provide a third partition for library commands. But Times2's partition swapping is about 10 times faster than DoubleDuty's. Also, with my program, you only need a system disk available for the first swap or for a soft reset (described below).

Times2 uses 187 bytes of high memory and is nondestructive. It duplicates any routines resident in upper memory and above HIGH$ when you install it and makes those routines active in the second partition as well as the first. This includes filters, routers, drivers, Debug or Clock status indicators, and the like. Any routines you activate after you install Times2 will work only in the partition in which you activate them.

The program duplicates active job control language (JCL) routines (those that call Times2) to the second partition. Therefore, when you enter the second partition, JCL takes control of your computer at the point right after Times2's invocation, even if the first partition has already completed the JCL operation. While you can use this creatively, it can also be a hindrance, in which case I suggest you invoke Times2 manually or use the command AUTO TIMES2.

Times2 has the added feature of speeding up the 4/4P's Model III-mode clock to run at 4 MHz. On the Model 4P, Times2 slows down the cursor-flash and key-repeat rates so you won't get dizzy and fall off your chair. It also compensates the real-time clock counter so that TIME$ doesn't run at double speed.

I couldn't compensate the cursor-flash rate and real-time clock counter on the Model 4; they're maintained in ROM. If this bothers you, omit the fast clock option when you install Times2 (see below).

Don't forget that the clock is specific to the partition it's in. When you exit a partition, its clock stops until you reenter the partition.

Swap and Go

To install Times2, assemble the source code in the Listing and save it to disk. Type in TIMES2 at LDOS ready and press the enter key. If you want the clock speed doubled, hold down the F key immediately after pressing the enter key. When you see the message "Release the <F> key," you know that you invoked the fast clock speed. Oh, and do release the F key when prompted.

Now put a Model III program disk in drive zero (and another in drive 1 if necessary) and load your program as usual. To switch partitions, press the control and right-shift keys simultaneously, then release them. This is a toggle sequence; the same keys switch you back.

For applications that require a reset to exit them, Times2 has a soft reset feature so you don't have to press the computer's reset button; that way, you won't lose Times2 and the program in the other partition. You'll also find this feature useful in recovering from system crashes or as an easy out to the LDOS ready prompt.

To use the soft reset, hold down the control and right-shift keys while you press the left-shift key and release it. Remember to put a system disk in drive zero before you invoke a soft reset.

Times2 provides no special key sequence to disable itself. For that, you'll have to press the reset button.

Dos and Don'ts

Times2's installation will abort if you already have the program resident and active, if another application has already intercepted and changed the DOS exit interrupt vector, or if installation would lower HIGH$ to below E000 hexadecimal (hex). Times2 can't duplicate more than 4K of high-memory routines to the second partition.

When one or a combination of these three conditions exists, Times2 generates an error message to let you know that it aborted its installation. If the second or third condition is true, you'll have to press the reset button and install the offending routines after you activate Times2. Remember, they're active only in the partition in which you install them.

Applications that don't respect HIGH$ will destroy Times2. If an application disables interrupts, none of the key sequences described will do anything. In other words, Times2 won't work, since it's interrupt-driven. I think such applications are few, however. The only program I own that disables interrupts for an extended period of time is one that plays music, and who wants to switch partitions in the middle of a song, anyway?

If an application that requires a reset to exit scrambles the resident operating system beyond recognition, Times2 may be rendered helpless. In such a case, try a soft reset and see what happens.

I'd caution against swapping partitions in the middle of disk accesses. Although I've done it successfully, I haven't tried it enough to ensure that it's safe. Programs usually disable interrupts during critical moments, preventing you from swapping, but keep the warning in mind.

I've found no problem with having the same file open in both partitions, but they've been relative files with fixed lengths. Obviously, if you're working with a file and you switch partitions, change the file's parameters, and switch back again, you could have a problem.

You can switch partitions during a printing job. When you switch back, the printer starts up where it left off. Don't send any output to the printer when you've left a printing job unfinished, though, unless you want mixed job output.

Switching during communications should be no problem as long as you don't switch while receiving data. Times2 doesn't send a stop-sending signal to the host, so you'll lose data. If your modem doesn't maintain the carrier signal without your software active, you may get disconnected, but that should be rare.

Don't try to SYSGEN Times2. You have to install it, because the program adjusts to its environment with the help of a loader, which you can't SYSGEN.

Times2 uses no interrupt slots. It intercepts the DOS exit from ROM, so active interrupt routines will be unaffected.

The program uses the second page of the video RAM, so avoid homebrew applications that use this area. You'll destroy screen information, and when you return to that partition, the screen won't look anything like the one you left.

Except for the special conditions outlined above, you can switch partitions in the middle of any input/output.

Program Structure

This section provides a general step-through to aid in interpreting and understanding Times2's source code. If you're not interested in the nuts and bolts of the program's operation, you can skip the section with impunity.

Times2 has four areas of operation. To minimize confusion, I labeled the source code with the same descriptive terms I'll use here.

I'll describe what each area accomplishes, not how it does so. Those who want more detail should study the com-

LOAD 80

System Requirements

Model 4/4P
Model III mode
128K RAM
LDOS 5.1.X
Assembly language
Editor/assembler

Illustration by Chris Demarest

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mented source code in conjunction with the *Model 4 Technical Reference Manual*'s hardware section.

Part 1, the loader, is the program's largest and most complex part. It checks the environment in which parts 2, 3, and 4 must operate and adjusts them accordingly. It finds where in high memory they must go to be out of the way.

The loader duplicates Times2 and any other high-memory-resident routines to what becomes the second partitions's upper half. It duplicates the operating system and all lower-memory functions into what becomes the second partitions's lower half. Finally, the loader puts part 2's execution address into the DOS exit vector for interrupts.

Part 2 is serviced by the real time clock interrupt. It checks the keyboard to see if you're switching partitions. If not, it passes control to the system interrupt routine, which flashes the cursor or checks for type-ahead characters and the like.

If the routine detects a switching command, it puts part 3's execution address on the stack and passes control to the system interrupt routine. This way, when the system interrupt routine is finished and executes its return from interrupt, control automatically returns to part 3, not to the address where the interrupt occurred.

Program Listing. Times2's source code.

```
0000  ;       TIMES2/CMD Written by E Cameron Snyder (c)1985
0100  ;  Splits Model 4 running Model 3 mode into 2 partitions.
0110  ;
0120  ;
0130  ;
0140          ;FIRST PART--LOADER
0150
0160
0170          ORG     5200H
0180  BEGIN   CALL    01C9H          ;CLEAR SCREEN
0190          LD      HL,3D00H
0200          LD      (4020H),HL
0210          LD      HL,MESS2       ;DISPLAY SCREEN HEADER
0220          LD      DE,3C05H
0230          LD      BC,53
0240          LDIR
0250          LD      HL,(4013H)     ;GET INT VECTOR
0260          LD      A,44H
0270          CP      H              ;CHECK IF TIMES2 RESIDENT
0280          JR      Z,CONT
0290  ERR     LD      HL,MESS3
0300          LD      DE,3C00H       ;IF SO DISPLAY ERROR
0310          LD      BC,86
0320          LDIR
0330          JP      EXIT           ;AND EXIT
0340  CONT    DI
0350          LD      HL,4210H       ;GET OPTIONS IMAGE
0360          LD      A,(HL)
0370          LD      (JSTPSD),A     ;SAVE THEM IN TIMES2
0380          LD      A,(3801H)
0390          CP      64             ;CHECK FOR <F> KEY
0400          JR      NZ,CONT2
0410          SET     6,(HL)
0420          LD      A,(HL)         ;ALTER OPTIONS IF <P>
0430          LD      (JSTPSD),A     ;SAVE THEM IN TIMES2
0440          OUT     (0ECH),A       ;ACTIVATE NEW OPTION
0450          LD      A,1            ;MAKE ROM
0460          OUT     (84H),A        ;IMAGE ADDRESSABLE
0470          LD      A,0CH
0480          LD      (3542H),A      ;INCREASE COUNTDOWN
0490          LD      A,3CH          ;TIMER LOCATIONS
0500          LD      (355DH),A      ;IN ROM
0510          LD      HL,MESS4
0520          LD      DE,3CD4H       ;TELL USER TO RELEASE
0530          LD      BC,19
0540          LDIR                   ;<P> KEY
0550  LOOP4   LD      A,(3801H)
0560          CP      0              ;DONT
0570          JR      NZ,LOOP4       ;CONTINUE UNTIL RELEASED
0580          LD      A,20H
0590          LD      HL,3CD4H
0600          LD      B,19           ;ERASE MESSAGE
0610  LOOP5   LD      (HL),A
0620          INC     HL
0630          DJNZ    LOOP5
0640  CONT2   LD      A,2            ;CHANGE MEMORY ADDRESS
0650          OUT     (84H),A        ;SCHEME...MOVE VIDEO &
0660          LD      H,4            ;KYBD ADDRESSES TO HIGH
0670          LD      HL,0F800R      ;MEM & CLEAR WHAT WILL
0680          LD      A,20R          ;BE PARTITION 2'S SCREEM
0690  LOOP6   PUSH    BC
0700          LD      B,0
0710  CLEAR   LD      (HL),A
0720          INC     HL
0730          DJNZ    CLEAR
0740          POP     BC
0750          DJNZ    LOOP6
0760          LD      HL,NESS        ;PUT PARTITION 2 HEADER
0770          LD      DE,0F800H      ;INTO PAGE 2 VIDEO
0780          LD      BC,23
0790          LDIR
0800          XOR     A
0810          OUT     (84H),A        ;RESTORE ADDRESS SCHEME
0820          LD      HL,402DH
0830          PUSH    HL
0840          LD      HL,(4411H)     ;GET HIGH$ & SAVE
0850          PUSH    HL             ;FOR NEXT CALCULATION
```

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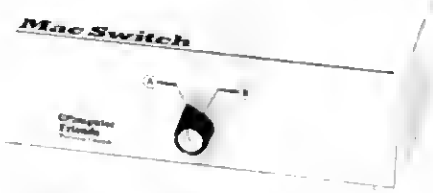

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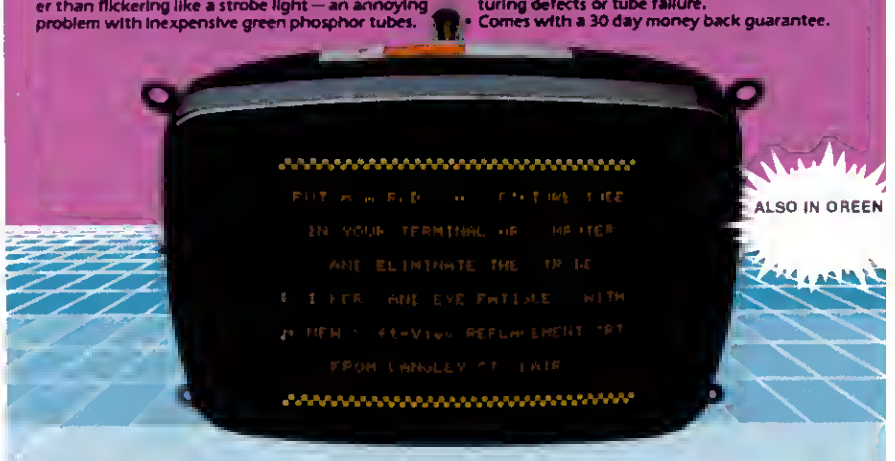

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Part 3 is the doorway or portal through which you pass to get to the other partition. It has two halves, one for leaving a partition and one for entering a partition. The routine's first half saves the address on top of the stack; this is the restart address, where the interrupt occurred and where the system should restart on reentry to the partition. Then, the first half saves all the registers so the second half can restore them on reentry, and switches partitions.

On entry to a partition, part 3's second half relocates part 4 to a safe area of lower RAM and passes control to it.

Part 4 does nothing more than save the exiting partition's screen and recover the entering partition's screen. It then returns control to part 3's second half, which recovers the reentry address from the stack, restores all the registers, and returns to where the interrupt occurred before the switch.

Modifications

If you like Times2's clock speed-up, but find it makes a game or other timing-critical program run too fast, you can reset bit 6 at location 4210 hex, then output the 4210 hex byte to port EC hex. The following four statements, inserted at the beginning of a Basic program, accomplish this:

```
var = PEEK(&H4210):
var = var AND 191 :
POKE &H4210,var:
OUT &HEC,var
```

You should replace "var" with some numeric variable. These statements force the partition to go slow. You'll switch speeds when you swap partitions, since Times2 remembers a partition's speed. To force the partition to go fast again, use the same four statements, substituting OR 64 for AND 191 in the second statement.

If you get tired of pressing F and prefer to invoke the speed-up automatically, apply this patch from LDOS ready:

```
PATCH TIMES2/CMD (X'5237' = 00 00)
```

Users who've upgraded to LDOS 5.1.4 don't need the F key or the above patch for the speed-up, since the operating system already provides this as a default. Also, executing CMD "SYSTEM(SLOW)" or CMD "SYSTEM(FAST)" from Basic precludes the use of the Basic statements listed above, since those commands function properly on the Model 4/4P under the new version.

The 5.1.4 version doesn't compensate the real time clock, key-repeat and cursor-flash rates on the 4P however. If your cursor is zipping along out of control or flashing you into catatonia, use the F key or apply the patch listed above and all will be well. ■

Cameron Snyder, business manager for the Sacramento Family Service Agency, uses his computer for business and pleasure. You can write to him at 7308 E. Parkway, Sacramento, CA 95823, or via CompuServe's EasyPlex mail service, ppn. 70645,1354.

Listing continued

```
                LD      DE,0E000H+1H7
                SBC     HL,DE           ;IS HIGH$ TOO LON
                JP      C,ERR           ;IP SO GOTO ERR & EXIT
                POP     HL
                PUSH    HL
                LD      BC,LAST-INTHLD  ;HEGIN
                SBC     HL,HC
                INC     HL              ;CALCULATING
                LD      (P13+1),HL
                POP     HL              ;NEW
                PUSH    HL
                LD      BC,LAST-P7      ;ABSOLUTE
                SBC     HL,BC
                INC     HL              ;ADDRESSES
                LD      (P9+1),HL
                POP     HL              ;DSED IN
                PUSH    HL
                LD      HC,LAST-CHG2    ;RELOCATED
                SBC     HL,HC
                INC     HL              ;ROUTINE
                LD      (P11+1),HL
                POP     HL              ;USING HIGH$ IN A FORMULA
                LD      BC,LAST-START
                LD      (STKHDR),SP     ;FOR OPPSET
                SBC     HL,BC
                LD      (4411H),HL      ;NEW MEM ADDR FOR HIGH$
                INC     HL
                PUSH    HL
                PUSH    HL
                PUSH    HL
                INC     HL
                INC     HL
                LD      (P1+1),HL
                LD      (P12+1),HL
                INC     HL
                LD      (P2+2),HL
                LD      (P5+2),HL
                LD      (P0+1),HL
                LD      (P10+1),HL
                LD      DE,14
                ADD     HL,DE
                LD      (P3+1),HL
                POP     HL
                EX      DE.HL
                LD      HL,(4013H)
                LD      (P6+1),HL
                LD      (4013H),DE      ;TIMES2 INTO INT VECTOR
                LD      (INTHLD),DE
                LD      HL,START        ;RELOCATE PARTS 2, 3 & 4
                LDIR                    ;TO HIGH MEM LOCATION
                LD      DE,6000H
                LD      HL,0FFFFH       ;MOVE HIGH MEM ROUTINES
                POP     BC              ;INTO BANK 0
                SBC     HL,BC
                PUSH    HL
                POP     BC
                INC     BC
                POP     HL
                POSH    BC
                LDIR
                LD      HL,6002H
                LD      BC,CHG-JSTPSD
                ADD     HL,HC           ;CUSTOMIZE IT FOR
                INC     HL              ;PARTITION 2
                LD      (HL),60H
                LD      BC,CHG2-CHG
                ADD     HL,BC
                LD      (HL),32H
                LD      BC,CHG3-CHG2
                ADD     HL,BC
                LD      (HL),30H
                LD      A,30H           ;SWITCH IN BANK 3
                OUT     (84H),A
                LD      HL,6000H        ;DDPLICATE ALL HIGH MEM
                LD      DE,(4411H)      ;ROUTINES TO BANK 3
                INC     DE              ;(UPPER HALF OF PARTITON
                POP     BC              ;2)
                LDIR
                LD      A,20H
                OUT     (84H),A         ;SWITCH IN BANK 2
                LD      HL,0
                LD      DE,0000H        ;OUPLICATE HANK 0
                LD      HC,8000H        ;TO BANK 2 (LDNER HALF
                LDIR                    ;OP PARTITION 2)
                LD      A,30H           ;ALL DONE SWITCH BACK
                OUT     (84H),A
EXIT            EI
                JP      402DH           ;AND EXIT

                ;PART TWO

START   JR      HERE            ;JMP PAST SAVE AREA
JSTPSD  DEFB    0
STKHDR  DEFW    0
        DEFW    0               ;POR STACK
        DEFW    0               ;AND REGISTERS
        DEFW    0
        DEFW    0
        DEFW    0
        DEFW    0
HTMSTK  DEFW    0
INTT    POP     AF              ;RESTORE
P6      JP      0               ;AND RESUME INT TASKS
HERE    PUSH    AF
```

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```
01910           LD      A,(3880H)       ;CHECK KYBD FOR SWITCH
01920           CP      6               ;COMMAND
01930           JR      NZ,INTT         ;NOT PRESSED, RETURN
01940           POP     AF
01950 P8        LD      (STKHDR),HL
01960 P9        LD      HL,P7           ;PRESSED SO SAVE PART
01970           PUSH    HL              ;THREE'S ADDRESS TO STACK
01980 P10       LD      HL,(STKHDR)
01990           JR      P6              ;CONTINUE W/ INT ROUTINE
02000
02010
02020           ;FIRST HALF--PART THREE
02030
02040
02050 P7        DI
02060           PUSH    AF
02070 LOOP      LD      A,(3880H)
02080           CP      7               ;SOFT RESET COMMAND?
02090           JR      Z,RESET         ;YES, GOTO IT
02100           CP      0
02110           JR      NZ,LOOP
02120           LD      A,(4210H)       ;GET OPTIONS AND
02130 P1        LD      (JSTPSD),A      ;SAVE FOR THIS PARTITION
02140           POP     AF
02150 P2        LD      (STKHDR),SP     ;SAVE STACK LOCATION
02160 P3        LD      SP,INTT         ;POINT STACK TO SAVE AREA
02170           PUSH    AF              ;SAVE REGISTERS
02180           PUSH    BC
02190           PUSH    DE
02200           PUSH    HL
02210           PUSH    IX
02220           PUSH    IY
02230 CHG       LD      A,30H
02240           OUT     (84H),A         ;SWITCH IN NEW PARTITION
02250
02260
02270           ;SECOND HALF--PART THREE
02280
02290
02300 RTN       POP     IY              ;RESTORE REGISTERS
02310           POP     IX
02320           POP     HL
02330           POP     DE
02340           POP     BC
02350           POP     AF
02360 P5        LD      SP,(STKHDR)     ;RESTORE STACK POINTER
02370           PUSH    AF
02380           PUSH    BC              ;SAVE REGISTERS USED
02390           PUSH    HL              ;BY PART FOUR
02400           PUSH    DE
02410           LD      DE,4300H
02420 P11       LD      HL,CHG2         ;RELOCATE PART FOUR
02430           LD      BC,MESS-CHG2
02440           LDIR
02450           CALL    4300H           ;CALL PART FOUR
02460 P12       LD      A,(JSTPSD)      ;GET OPTIONS FOR THIS
02470           LD      (4210H),A       ;PARTITION AND RESTORE
02480           OUT     (0ECH),A
02490           POP     DE
02500           POP     HL
02510           POP     BC
02520           POP     AF
02530           EI
02540           RET                     ;CONTINUE WITH PROCESSING
02550 RESET     LD      A,(3880H)
02560           CP      8
02570           JR      NZ,RESET
02580           POP     AF
02590 P13       LD      HL,(INTHLD)     ;SOFT RESET SECTION
02600           LD      (4013H),HL
02610           EI
02620           JP      402DH
02630
02640
02650           ;PART FOUR
02660
02670
02680 CHG2      LD      A,62H           ;CHG MEMORY SCHEME
02690           OUT     (84H),A
02700           LD      DE,3C00H        ;MOVE PRESENT SCREEN
02710           LD      HL,0FC00H       ;TO SHADOWED RAM
02720           LD      BC,1024
02730           LDIR
02740           LD      DE,0FC00H       ;MOVE VIDEO PAGE 2
02750           LD      HL,0F800H       ;TO VIDEO PAGE 1
02760           LD      BC,1024
02770           LDIR
02780           LD      HL,3C00H        ;MOVE SHADOWED RAM
02790           LD      DE,0F800N       ;TO VIDEO PAGE 2
02800           LD      BC,1024
02810           LDIR
02820 CHG3      LD      A,60H           ;RESTORE MEMORY SCHEME
02830           OUT     (B4H),A
02840 STOP      RET                     ;RTN 2ND HALF PART THREE
02850 INTHLD    DEFW    0
02860 LAST      DEFB    0
02870 MESS      DEFM    '***  Partition Two  ***'
02880 MESS2     DEFM    '<<< TIMES2 -'
02890           DEFM    ' Written by E. Cameron Snyder'
02900           DEFM    ' (c)1985 >>>'
02910 MESS3     DEFM    'TIMES2 already resident or other CONFLICTING routine resi
dent.  '
02920           DEFM    'Push RESET and reload.'
02930 MESS4     DEFM    'RELEASE THE <F> KEY'
02940           END     BEGIN
```

End

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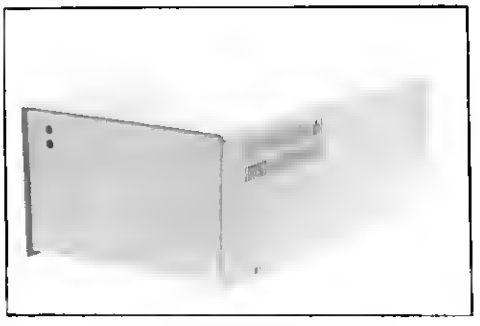

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by Andy Levinson

Patch Work II: The Sequel

With these 13 additional improvements, TRSDOS 1.3 gets better and better.

Sometimes, a good patch just isn't enough. You improve your disk a bit, it runs a little better, and you think you'll be happy. But you aren't. You always want more.

This is what I found after I'd patched my TRSDOS 1.3 disk. I thought I was done, but after I published my 13 patches in *80 Micro* ("Patch Work," January 1985, p. 112), I received letters and telephone calls from readers asking questions and making suggestions for new patches. Building on those suggestions, I compiled another 13 patches for TRSDOS 1.3; although these are more thorough than the first bunch, they still don't create the definitive DOS.

Patch Purposes

These 13 new patches improve TRSDOS 1.3's efficiency and convenience. They let you repeat DOS commands, type DOS commands in lower- or uppercase, include comment lines in do-files, skip the password prompt and check for the Purge and Back-up commands, create a default disk name for the Format command, select a more logical default parameter for the List command, change the disk drive stepping rate, use Debug to view any memory address and the Dump command to dump any address, eliminate or shorten Basic's opening banner, alter the TRSDOS boot-up and Ready messages, change the cursor character, select a global password protection level, and display a directory listing one page at a time with a prompt to continue.

Installing the Patches

Naturally, you don't have to install all the patches; just pick the ones you want. If you want to avoid typing them anew for each disk, you can use the do-file creator program on this month's Load 80 (see p. 6). DOMAKER/BAS displays each patch, lets you select the ones you want, and creates a do-file so you can apply the patches to as many disks as you like without retyping.

Getting Started

You install the patches with the TRSDOS Patch command. This is simple to do, but make sure your disk isn't write-protected. Start at TRSDOS Ready. Type in the desired patch, proofread it, then press the enter key to finish the command. If a patch has more than one line, be sure to enter all lines before doing anything else. For example, if a patch has three patch lines, you must enter all three lines in the order given as three separate TRSDOS commands. Do not invoke any other DOS commands until you finish all patching.

If you get an error message when installing a patch, try to determine what is wrong before continuing. Also remember that some patches don't take effect until you reboot your computer.

Patching writes new code to the machine-language system programs stored on disk. So, if you make one typographical error, you could destroy a disk in seconds. Always install a new patch on a back-up disk. Don't patch more important disks until you know the patches are working as expected.

If you've applied non-Radio Shack patches to your TRSDOS 1.3 disk, these 13 patches might not work. However, they do work with all the patches in "Patch Work."

The Patches

Since "Patch Work" contained the first 13 patches, I've begun numbering the patches presented here at 14. Figure 1 contains the code for all the patches.

Patch 14 improves the way TRSDOS 1.3 accepts DOS commands. First, it gives you repeating DOS commands: press the enter key and the computer displays and executes your last DOS command. Second, you can enter a DOS command in lower- or uppercase letters or a combination of the two. (The computer internally converts the letters to uppercase. This patch works fine for DOS commands, but some programs and utilities may still accept only uppercase letters.)

Third, the computer will ignore any DOS command line that begins with a period. While this may sound silly, it is actually quite useful. You can now put comment lines in do-files by beginning those lines with a period. When you run the do-file, the computer displays the comment lines but doesn't try to execute them or return an error message.

This new routine does not erase the TRSDOS Ready dots. (That is where I put the new code). Therefore, you'll probably want to eliminate those dots. Patch 10 from "Patch Work" takes care of that.

Patch 15 switches the default parameter for the TRSDOS List command. Normally, TRSDOS lists files in the confusing hexadecimal (hex) format unless you use the ASCII parameter. Once you install Patch 15, TRSDOS will list files in the legible ASCII format unless you add the new Hex parameter.

Patch 16 improves the Dump command so you can dump any memory address, not just those above 5FFF hex. Patch 17 lets the Debug utility examine any memory address, not just those above 55FF hex. It can also modify code at any memory address except those in ROM. Radio Shack originally issued Patch 17 in *Microcomputer News* (February 1982, p. 21, and June 1982, p. 33) but has given permission for me to reprint it here.

Patch 18 modifies the Back-up command so it bypasses the password prompt, ignores the disk master password, and improves the Format command. Press the enter key when TRSDOS asks you to name the disk. Rather than asking again for a

LOAD 80

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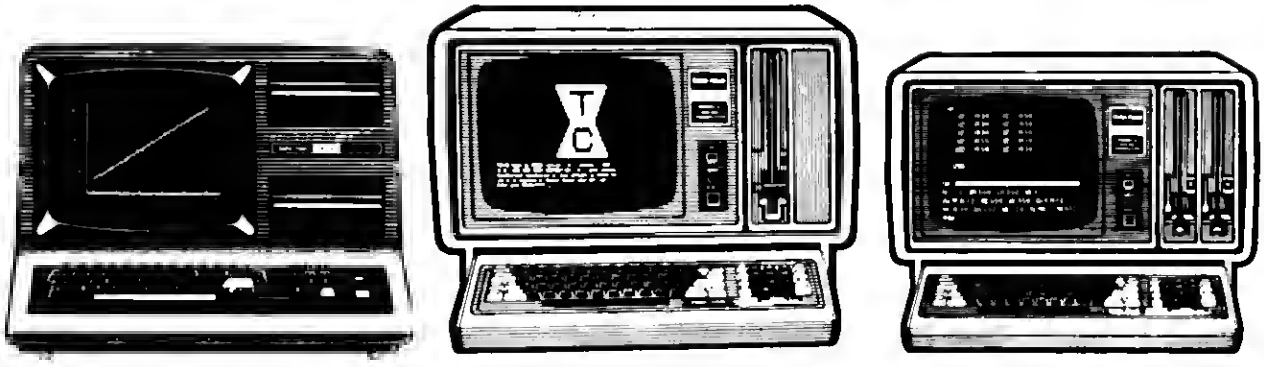

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Patch 23 affects the entire TRSDOS 1.3 password-protection scheme.

name, the program continues and names the new disk "DATADISK."

Patch 19 changes the Purge command so it no longer asks for nor cares about the disk master password.

Patch 20 augments Patch 3 of "Patch Work," which improves the Directory command so it displays directory files in the normal long format but only one page at a time. If there are too many entries for a screen, the listing pauses and waits for you to press the enter key to continue. With Patch 20 in place, a message appears at the appropriate time to remind you to press the enter key. Apply Patch 20a if you've already applied Patch 3; apply 20b if you have not. Don't apply both.

Patch 21 shortens or eliminates Basic's opening message. This is useful with a Basic program that operates under the AUTO command. Install 21a if you want to eliminate Basic's opening banner, install 21b if you want to shorten the banner so it displays only the amount of free memory and number of file buffers available. Pick one patch but not both.

Patch 22 alters the default cursor and keyboard values when you reboot the computer. Normally, TRSDOS begins with a flashing cursor set to a graphics block (ASCII value 176) and with the caps lock on. In the code for Patch 22, change the "xx" to the hex value of the cursor character you want. For example, use 5F for an underscore or C4 for the smiling face.

Change the "y" to 1 for a non-flashing cursor or to zero for a flashing cursor. Change the "z" to 1 to begin with the caps lock on, or to zero upper- and lowercase. This last setting is nice if you've applied Patch 14.

You can't install Patch 22 unless you've applied Patch 7. That patch improves the Auto command so the computer displays the name of the file you're automatically loading rather than just the message "AUTO Function Engaged." Patch 22 uses space freed up when you apply Patch 7. Remember, you can't use Patch 22 as is; change the variables to the settings you want.

Patch 23 affects the entire TRSDOS 1.3 password-protection scheme. Use it for special purposes. By only applying 23a, you can access any file on the disk regardless of password protection. By adding 23b, you'll give every file the protection level you designate, whether the file has a

```
Patch 14
  PATCH *0 (ADD=4CD1,PIND=204E53,CHG=4E538D)
  PATCB *1 (ADD=4E32,PIND=212542112642,CHG=180B773E1BCD)
  PATCB *1 (ADD=4E38,PIND=013P0036G0EDB0,CHG=3300CD1H02186F)
  PATCB *1 (ADD=4E9D,PIND=E5C52A,CBG=C3BB4E)
  PATCH *1 (ADD=4EA0,PIND=2040E548060009,CHG=1A20917EPE6138)
  PATCH *1 (ADD=4EA7,PIND=014000B7ED4222,CHG=03D620772310P5)
  PATCH *1 (ADD=4EAE,PIND=20403E1ECD3300,CHG=D1E17E12PE2ECA)
  PATCH *1 (ADD=4EB5,PIND=E1222040C1E1,CHG=4A4EFE0D280P)
  PATCH *1 (ADD=4E9B,FIND=28ADC3HH4E,CHG=11D44CE5D5)

Patch 15
  PATCH *11 (ADD=593E,PIND=20,CHG=20)
  PATCH *11 (ADD=5949,PIND=EDB0,CHG=0000)
  PATCH *11 (ADD=595C,PIND=28,CHG=20)
  PATCH *11 (ADD=5B89,PIND=4153434949,CHG=4845582020)
  PATCH *11 (ADD=5AC5,PIND=20,CHG=28)
  PATCH *11 (ADD=5B3C,FIND=3030303030,CHG=4153434949)

Patch 16
  PATCH *6 (ADD=5702,FIND=60,CHG=00)
  PATCH *6 (ADD=579C,FIND=D22552,CHG=000000)

Patch 17
  PATCH *5 (ADD=4EDF,PIND=38E6,CHG=0000)
  PATCH *5 (ADD=4F04,PIND=D0,CHG=C9)
  PATCH *5 (ADD=506E,PIND=38E3,CHG=0000)

Patch 18
  PATCH *7 (ADD=5013,PIND=534P55524345,CHG=PE08C0E1211D)
  PATCH *7 (ADD=5019,PIND=204469736H20,CHG=50C383564441)
  PATCB *7 (ADD=501P,PIND=4D6173746572,CHG=54414449534H)
  PATCH *7 (ADD=55A8,FIND=28,CHG=18)
  PATCH *7 (ADD=5657,PIND=21,CHG=C9)
  PATCB *7 (ADD=5673,FIND=FE0828EF,CHG=CD135000)

Patch 19
  PATCH *11 (ADD=5648,PIND=66,CHG=99)
  PATCB *11 (ADD=564D,PIND=21A25B,CHG=C36E56)
  PATCH *11 (ADD=5693,PIND=28,CHG=18)

Patch 20a (Use if you've installed Patch 3.)
  PATCH *6 (ADD=6111,FIND=8D8800,CHG=202003)
  PATCH *6 (ADD=6174,FIND=7C61,CHG=CP60)

Patch 20b (Use if you haven't installed Patch 3.)
  PATCH *6 (ADD=6111,FIND=0D0000,CHG=202003)
  PATCH *6 (ADD=616D,PIND=CD8861B7C8FE48,CHG=3A803FD620C8CD)
  PATCH *6 (ADD=6174,PIND=2806C547AF78C1,CHG=CP60CDC901AFC9)

Patch 21a (Completely eliminates Basic's opening banner.)
  PATCH BASIC/CMD (ADD=62EF,FIND=CD,CHG=C9)

Patch 21b (Shortens Basic's opening banner to one line.)
  PATCH BASIC/CMD (ADD=62ED,FIND=29,CHG=8F)

Patch 22
  PATCH *0 (ADD=4E11,PIND=21P443,CHG=CD6B4P)
  PATCH *0 (ADD=4P6B,PIND=4155544F2046,CHG=3E0z3219403E)
  PATCH *0 (ADD=4F71,PIND=756E6374696F,CHG=8y321C403Exx)
  PATCH *0 (ADD=4F77,PIND=6E20456E676167,CHG=32234021P443C9)

Patch 23a (Gives full or partial file access. Needed for 23b.)
  PATCH *2 (ADD=4ED4,PIND=20,CHG=18)

Patch 23b (For a designated global file protection level.)
  PATCB *2 (ADD=4ECB,PIND=00,CHG=0x)

Patch 24
  PATCH *0 (ADD=42EE,PIND=0C,CHG=0x)
  PATCB *0 (ADD=4516,PIND=0C,CBG=0x)
  PATCB *0 (ADD=4544,PIND=1C,CBG=1x)
  PATCH *0 (ADD=4PE1,PIND=0C,CBG=0x)
  PATCH *7 (ADD=580E,PIND=0C,CHG=0x)
  PATCH *7 (ADD=5841,PIND=0C,CHG=0x)
  PATCH *7 (ADD=5B3C,FIND=58,CHG=5y)

Patch 25
  PATCH *1 (ADD=509C,PIND=545253444P53,CHG=xxxxxxxxxxxx)
  PATCH *1 (ADD=50A2,FIND=205265616479,CHG=xxxxxxxxxxxx)

Patch 26
  PATCH *0 (ADD=5016,FIND=5452532D383020,CHG=xxxxxxxxxxxxxx)
  PATCH *0 (ADD=501D,PIND=4D6F64656C2049,CHG=xxxxxxxxxxxxxx)
  PATCH *0 (ADD=5824,PIND=494920545253 44,CHG=xxxxxxxxxxxxxx)
  PATCH *0 (ADD=502B,PIND=4F532076657273,CHG=xxxxxxxxxxxxxx)
  PATCH *0 (ADD=5032,PIND=696F6E20312E33,CHG=xxxxxxxxxxxxxx)
```

Figure 1. Patches 14-26. Make sure you leave a space after the word PATCH.

Patch 25 lets you change the TRSDOS Ready prompt to the message of your choice.

password or not. This is useful in places such as schools where students "accidentally" destroy other students' files. Set the protection level to 5 and a student can read, list, or execute any file, as well as save it under a new name. However, the student can't kill or overwrite a file.

You can't use the patch line in 23b as is. Change the "x" to the protection level you want, from zero (full access) to 7 (no access). Do not use a protection level of 3 as TRSDOS does not fully support it. If you apply 23a alone, all files will always have full access status.

Patch 24 changes the disk drive stepping rate. TRSDOS steps all disk drives at the same rate. As distributed, that rate is 6 milliseconds (ms). Some older drives can't step that fast. To help avoid disk errors, use a slower stepping rate. Patch 24 lets you select one of the four rates permitted by the disk controller: 6, 12, 20, or 30ms. Try to use the fastest rate that doesn't give you disk errors.

Before using this patch, change the "x" to C, D, E, or F, and the "y" to 8, 9, A, or B for 6, 12, 20, or 30 ms rates, respectively. Once patched, the selected rate works for all disk drives at all times except during the system boot. TRSDOS 1.3 uses only one stepping rate for all drives. You'd have to rewrite too much system code to permit setting separate stepping rates for individual disk drives.

Patch 25 lets you change the TRSDOS Ready prompt to the message of your choice. Many people asked for this patch so they wouldn't confuse regular TRSDOS 1.3 with a modified version. This change requires some work on your part.

You must first compose your new prompt. It should consist of 12 or fewer characters. If you use fewer than 12 characters, add spaces to bring the total up to 12. Almost any character, even a graphics block, works fine. However, you should avoid control characters (ASCII values less than 32) and all special characters (ASCII values greater than 191).

Next, convert each character in your message to a hex pair (see the table in the Model III manual). For example, the letters A and Z become 41 and 5A hex. Don't forget the spaces that convert to 20 hex.

Don't use the code for Patch 25 as listed. Instead, substitute the first six hex pairs of your message for the CHG value in the first patch line and the second six pairs as the CHG value in the second patch line. See Fig. 2a for an example of an altered prompt.

Patch 26 is similar to Patch 25, except that it modifies the message the computer displays when you boot TRSDOS. However, it gives you 35 characters to work with rather than 12. The procedure, though, is identical. Design your message, convert it to hex pairs, then use those pairs in place of the "xx" values in the five patch lines. Each line holds seven characters. Break your message into groups of seven hex pairs, then assign each in order to each patch line. Don't forget to pad your messages with spaces if your message is shorter than 35 characters.

Patch 26 only affects the message that remains after you've installed Patch 11. Patch 11 shortens the boot-up banner from a picture to just one line. You don't have to use Patch 11, but if you don't, your new boot message could get lost in the crowd.

You can't use Patch 26 as listed. Substitute the hex pairs of your message for the CHG values. Figure 2b shows the patch for a sample message.■

Write to Andy Levinson at 11575 Sunshine Terrace, Studio City, CA 91604. Enclose a stamped, addressed envelope for a reply.

Related Article

Levinson, Andy. "Patch Work," January 1985, p. 112. Thirteen patches for TRSDOS 1.3 (Debug: March 1985, p. 27).

```
(a)  PATCH *1 (ADD=509C,FIND=545253444F53,CHG=855061746360)
     PATCH *1 (ADD=50A2,FIND=205265616479,CHG=20576F726B8A)

(b)  PATCH *0 (ADD=5016,FIND=5452532D383020,CHG=57656C636F6D65)
     PATCH *0 (ADD=501D,FIND=4D6F64656C2049,CHG=20746F20537570)
     PATCH *0 (ADD=5024,FIND=49492054525344,CHG=657263606172 67)
     PATCH *0 (ADD=502B,FIND=4F532076657273,CHG=65642054525344)
     PATCH *0 (ADD=5032,FIND=696F6E20312E33,CHG=4F5320312E332B)
```

Figure 2. (a) Sample values for Patch 25. These change the TRSDOS Ready message to Patch Work. (b) Sample values for Patch 26; these change the opening TRSDOS display to Welcome to Supercharged TRSDOS 1.3+.

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by Alan D. Smith

Upgraded Graphics

Add the Model 4's missing Point, Set, and Reset commands to your Basic programs.

Program Listing 1. Pixel graphics routine.

```
1 DEFINT P,R,S: PXLCODE$ = "<-------10*-------20*-------30*-------40*-------50*--
-----60*-------70*-------80*-------90*------100*--->"
2 DATA 175,24,6,62,1,24,2,62,2,245,229,221,225,221,43,221,110,1,221,94,2,14,3,
       62,93,239,103,203,61,6,1,48,1,4,175,221,119,1,221,119,2,107,40,7,203,32,
       203,32,29,24,246,197
3 DATA 6,1,62,15,239,193,203,127,40,4,203,119,40,2,62,128,79,241,254,1,121,56,
       18,40,8,176,6,2,79,62,15,239,201,79,120,47,71,121,160,24,241,160,200,221,
       54,1,255,221,54,2,255,201
4 PXLPTR! = VARPTR(PXLCODE$): PXLPTR! = PEEK(PXLPTR!+1) + PEEK(PXLPTR!+2)*256
5 FOR PXLINDEX=0 TO 103: READ PXLBYTE: POKE PXLPTR!+PXLINDEX, PXLBYTE: NEXT
6 DEF FN POINT(X%,Y%) = USR 7(X% + Y%*256): DEF USR 7 = PXLPTR!
7 DEF FN RESET(X%,Y%) = USR 8(X% + Y%*256): DEF USR 8 = PXLPTR! + 3
8 DEF FN SET(X%,Y%)   = USR 9(X% + Y%*256): DEF USR 9 = PXLPTR! + 7
```

End

Program Listing 2. Merge with Program Listing 1 for a demonstration.

```
1000 REM Title for short demo .....
1010 CLS: DEFINT A-Z: PRINT CHR$(15): REM Turn cursor off
1020 PRINT@ (10,22), "PIXEL4 - a POINT/RESET/SET facility"
1030 PRINT@ (11,22), "for Model 4 BASIC by Alan D. Smith."
1040 PRINT@ (12,22), STRING$(35,"-")
1050 FOR X=0 TO 12000: NEXT: CLS: REM Hold title
1060 REM Now draw grid .....
1070 FOR X=0 TO 152 STEP 16: FOR Y=0 TO 71 : DUMMY=FNSET(X,Y): NEXT: NEXT
1080 FOR Y=2 TO 69 STEP 6: FOR X=0 TO 159 : DUMMY=FNSET(X,Y): NEXT: NEXT
1090 FOR X=0 TO 6000: NEXT: CLS: REM Hold grid
1100 REM Now do box for "inversion" .....
1110 POR X=50 TO 109: DUMMY=FNSET(X,17): DUMMY=PNSET(X,56): NEXT
1120 FOR Y=18 TO 55: DUMMY=FNSET(50,Y): DUMMY=PNSET(109,Y): NEXT
1130 PRINT@ (4,24), "Setting random bits via FNSET .....";
1140 POR X=1 TO 500: DUMMY=FNSET(RND(58)+50,RND(38)+17): NEXT
1150 PRINT@ (4,17), "Inverting all bits via PNPOINT/PNRESET/PNSET .....";
1160 POR X=51 TO 108: FOR Y=18 TO 55
1170 IP FNPOINT(X,Y) THEN DUMMY=FNRESET(X,Y) ELSE DUMMY=FNSET(X,Y)
1180 NEXT: NEXT
1190 FOR X=0 TO 12000: NEXT: CLS: PRINT CHR$(14): END: REM Turn cursor back on
```

End

Program Listing 3. Source code for Pixel's data statements.

```
00010 DIV8    EQU     93      ;8-BIT DIVIDE SVC
00020 VDCTL   EQU     15      ;VIDEO CONTROL FUNCTION SVC
00030 ;
00040 ; USR 7 ("POINT") ENTRY .....
00050         XOR     A       ;INDICATE "POINT"
00060         JR      START   ;JUMP TO COMMON START
00070 ;
00080 ; USR 0 ("RESET") ENTRY .....
00090         LD      A,1     ;INDICATE "RESET"
00100         JR      START   ;JUMP TO COMMON START
00110 ;
00120 ;USR 9 ("SET") ENTRY .....
00130         LD      A,2     ;INDICATE "SET"
00140 ;
00150 ;START BY PICKING UP INPUT ARGUMENTS (X/Y CO-ORDS) .....
00160 START   PUSH    AF      ;SAVE ENTRY OPTION (0/1/2) EX A
```

Listing 3 continued

Upgrading from my trusty Model III to the Model 4 had its advantages, but I was a little disappointed to find that the TRSDOS 6.X version of Basic lacked the Point, Set, and Reset graphics commands. I could always turn screen dots on and off at the character level, but I wanted individual pixel control, which just wasn't available. So I wrote a Basic routine, called Pixel, that you can use at the beginning of any program to install the Point, Set, and Reset functions on a Model 4.

Points of Interest

Type in Program Listing 1 and save it to disk with the ASCII option (SAVE "PIXEL",A). Now you can merge it with another program or load it into Basic before writing a new program.

In the routine, Point, Set, and Reset are defined functions that interface with a 104-byte machine-language subroutine. The syntax for calling these commands differs from the Model III's as shown below:

Model III	Model 4
POINT	FNPOINT
SET	DUMMY = FNSET
RESET	DUMMY = FNRESET

For example:

Model III:	IF POINT(X,Y) THEN GOSUB 1200
Model 4:	IF FNPOINT(X,Y) THEN GOSUB 1200
Model III:	SET(10,25)
Model 4:	DUMMY = FNSET(10,25)
Model III:	RESET (X,Y)
Model 4:	DUMMY = FNRESET(X,Y)

LOAD 80

System Requirements

Model 4
64K RAM
Disk Basic

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Listing 3 continued

```
00170          PUSH    HL        ;ARGUMENT STORAGE AREA (ASA) ADDR
00180          POP     IX        ;TRANSFER ASA ADDR TO IX
00190          DEC     IX        ;ADJUST TO ENSURE NO 0'S IN CODE
00200          LD      L,(IX+1)  ;X CO-ORD TO L
00210          LD      E,(IX+2)  ;Y CO-ORD TO E
00220 ;
00230 ; CONVERT X/Y CO-ORDS TO SCREEN ROW & COLUMN .....
00240          LD      C,3       ;DIVISOR FOR @DIV8
00250          LD      A,DIV8    ;MOD4 TECH REF MANUAL (@DIV8)
00260          RST     28H       ;Y/3 -> ROW IN A, REMAINDER IN E
00270          LD      B,A       ;ROW TO B
00280          SRL     L         ;X CO-ORD / 2 (= COL)
00290 ;
00300 ; CALCULATE BIT MASK WITHIN BYTE .....
00310          LD      B,1       ;SET BIT MASK TO 01B
00320          JR      NC,CLEARA ;JUMP IF NO CARRY FROM SRL
00330          INC     B         ;IF CARRY, MAKE BIT MASK 02H
00340 CLEARA   XOR     A         ;ZEROISE A FOR COMPARE
00350          LD      (IX+1),A  ;ZEROISE ASA FOR POINT
00360          LD      (IX+2),A  ;     (OFF) OR ERROR RETURN
00370 ADJMSK   CP      E         ;SHIFT COUNTER = 0?
00380          JR      Z,GETCHR  ;JUMP IF YES
00390          SLA     B         ;NO-
00400          SLA     B         ;   ADJUST BIT MASK
00410          DEC     E         ;DECREMENT SHIFT COUNTER
00420          JR      ADJMSK    ;LOOP TILL BIT MASK OK
00430 ;
00440 ;GET CURRENT SCREEN CHAR CONTAINING REQ'D PIXEL .....
00450 GETCHR   PUSH    BC        ;SAVE BIT MASK EX B
00460          LD      B,1       ;@VDCTL OPTION
00470          LD      A,VDCTL   ;MOD4 TECH REF MANUAL (@VDCTL)
00480          RST     28H       ;GET CHAR FROM SCREEN
00490          POP     BC        ;RESTORE BIT MASK EX B
00500          BIT     7,A       ;SCREEN CHAR ALREADY GRAPHICS?
00510          JR      Z,MKGRPH  ;JUMP IF NO
00520          BIT     6,A       ;SCREEN CHAR ALREADY GRAPHICS?
00530          JR      Z,CHKOPT  ;JUMP IF YES
00540 MKGRPH   LD      A,128     ;MAKE IT A GRAPHICS CHAR
00550 CHKOPT   LD      C,A       ;SAVE SCREEN CHAR TO C
00560          POP     AF        ;RESTORE ORIGINAL ENTRY OPTION
00570          CP      1         ;CHECK WHAT IT WAS
00580          LD      A,C       ;(RESTORE SCREEN CHAR TO A)
00590          JR      C,POINT   ;JUMP IF POINT REQUIRED
00600          JR      Z,RESET   ;JUMP IF RESET REQUIRED
00610 ;
00620 ;SET REQUIRED .....
00630          OR      B         ;MODIFY SCREEN CHAR (SET BIT)
00640 SCRNOF   LD      B,2       ;@VDCTL OPTION
00650          LD      C,A       ;MODIFIED SCREEN CHAR TO C
00660          LD      A,VDCTL   ;MOD4 TECH REF MANUAL (@VDCTL)
00670          RST     28H       ;RE-DISPLAY MODIFIED SCREEN CHAR
00680          RET               ;BACK TO BASIC
00690 ;
00700 ;RESET REQUIRED .....
00710 RESET    LD      C,A       ;SAVE SCREEN CHAR
00720          LD      A,B       ;BIT MASK TO A
00730          CPL               ;INVERT MASK BITS FOR "AND"
00740          LD      B,A       ;BIT MASK BACK TO B
00750          LD      A,C       ;RESTORE SCREEN CHAR TO A
00760          AND     B         ;MODIFY SCREEN CHAR (RESET BIT)
00770          JR      SCRNOF    ;GO RE-DISPLAY IT
00780 ;
00790 ;POINT REQUIRED .....
00800 POINT    AND     B         ;DETERMINE POINT STATUS
00810          RET     Z         ;RET IF BIT OFF (ASA ALREADY SET)
00820          LD      (IX+1),0FFH ;INDICATE "ON"
00830          LD      (IX+2),0FFH ;  (-1) IN ASA
00840          RET               ;BACK TO BASIC
00850          END
```

End

You can substitute any variable name for "Dummy," as in Z = FNSET(10,25).

For a demonstration of Pixel's graphics, merge Program Listing 2 with Listing 1 and run the merged program.

Axis Powers

The Model III's graphics coordinates range from 0–27 horizontally and from 0–47 vertically. Pixel supports the Model 4's larger screen with more pixels, so its limits are 0–159 along the X axis and 0–71 along the Y axis. If you use values outside those ranges, the functions will do nothing or, at worst, generate an overflow error.

The Nitty-Gritty

The key to Pixel lies in lines 2 and 3 of Listing 1. This is the machine-language code that Pixel POKEs into the string called PXLCODE$ in line 1, and it executes there every time you use Point, Set, or Reset. By the way, use special care when you type in line 1: if the string isn't at least 104 characters long, the machine-language code won't fit.

Line 4 obtains this string's address in PXLPTR!, while line 5 sets up the code therein. Lines 6, 7, and 8 define the three new functions and their entry points.

You don't have to know anything about Assembler or machine language to use Pixel. However, if you're interested in the programming technique used here, take a look at Program Listing 3, the source for the data statements. The supervisor calls (SVCs) make it possible for TRSDOS 6.X to perform certain specialized functions. In my program, the most critical call is the @VDCTL SVC, which facilitates screen-related functions.■

Contact Alan D. Smith at P.O. Box 119, Mortdale, N.S.W. 2223, Australia.

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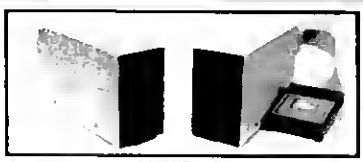

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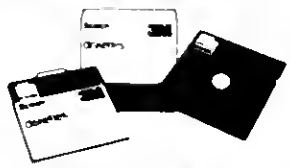

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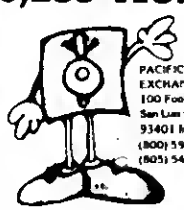

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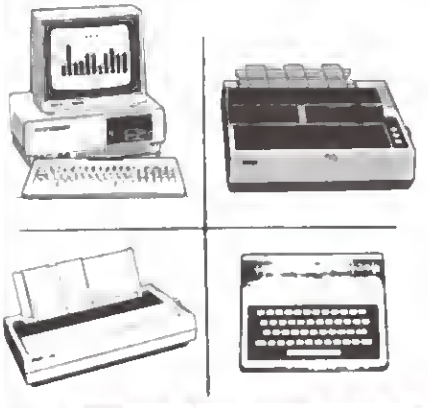

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A computer's multiplication process is more involved than you might realize. A processor must execute hundreds of machine-language instructions to multiply two numbers. This month, I'll discuss how a computer multiplies numbers from a software standpoint and describe two hardware projects that illustrate multiplication methods.

I will limit my discussion to multiplying unsigned integers. While multiplying signed and floating-point numbers is more complex, it's a logical extension of unsigned integer multiplication, and the principles described below also apply.

A computer executes seven steps in multiplication:

- It stores the ASCII key values from the keyboard into a buffer area.
- It converts the ASCII number values to packed BCD format.
- It converts the packed BCD values to pure binary format.
- It does the actual multiplication with the binary numbers.
- It converts the product from binary to packed BCD format.
- It converts the packed BCD product to ASCII.
- It sends the product to the computer display, suppressing leading zeros.

I will cover only step 4 (the actual multiplication), assuming that the numbers you want to multiply are already in binary format.

The Multiplication Algorithm

Binary multiplication is similar to decimal multiplication, though binary is more simple, since each digit of the multiplier is always either a zero or a 1. Figure 1 shows the typical decimal multiplication of 238 by 312.

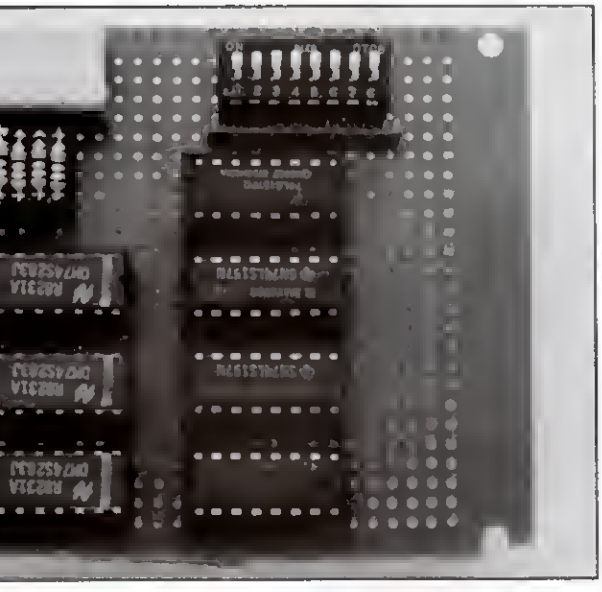

Photo 1. 4- by 4-bit sequential multiplier.

As shown, the computer first multiplies 312 (the multiplicand) by the low-order digit of the multiplier (8); it then puts this product below the line, to add it to other values later. The processor then multiplies the 312 by the next-higher-order multiplier digit (3), and puts this product below the first one, but shifts it one position to the left.

Finally, the computer multiplies the multiplicand by the high-order multiplier digit (2) and puts this product below the previously calculated products, shifted yet another position to the left.

Once the computer calculates all the partial products, it adds them together. You could consider multiplication as merely a systematic sequence of partial products, shifts, and additions. But how do you calculate the partial products? This is where the simplicity of binary numbers makes calculations easy.

Consider the multiplication of two binary numbers (5 times 6 in decimal) shown in Fig. 2. The computer first multiplies the multiplicand (6) by the low-order multiplier digit (1), and brings the product down below the line. It then multiplies 6 by the next-higher-order multiplier digit (zero), and puts the product below the first partial product, shifted one position to the left. Finally, the processor multiplies the multiplicand by the high-order multiplier digit (1), and puts this partial product below the previous two partial products, shifted one additional position to the left. The computer then adds the partial products to get the final product.

The sequence described above continues for any additional digits that may be in the multiplier. Each partial product is

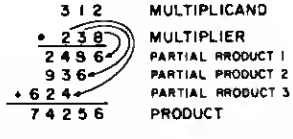

Figure 1. Decimal multiplication example.

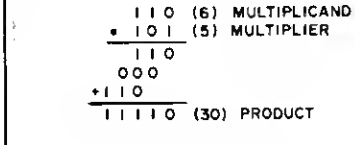

Figure 2. Binary multiplication example.

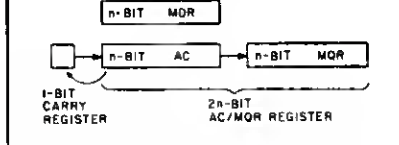

Figure 3. Multiplier register structure.

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always either zero or the multiplicand, since each multiplier digit is either zero (resulting in a zero partial product) or 1 (resulting in the multiplicand as the partial product). You should note that, like decimal multiplication, the product of two n-digit binary numbers has up to 2n digits.

You can implement the multiplication procedure in a number of ways, and I'll describe one common method. Picture your multiplier as having three n-bit registers (for performing n- by n-bit multiplication): an accumulator (AC), a memory data register (MDR), and a multiply quotient register. The computer must logically connect the AC and MQR so that it can shift a bit out of the low-order AC bit position into the high-order MQR bit position. AC and MQR together form a double-precision (2n length) register (referred to as AC/MQR). You must also have a 1-bit register (Carry) to hold the carry out of the AC during the addi-

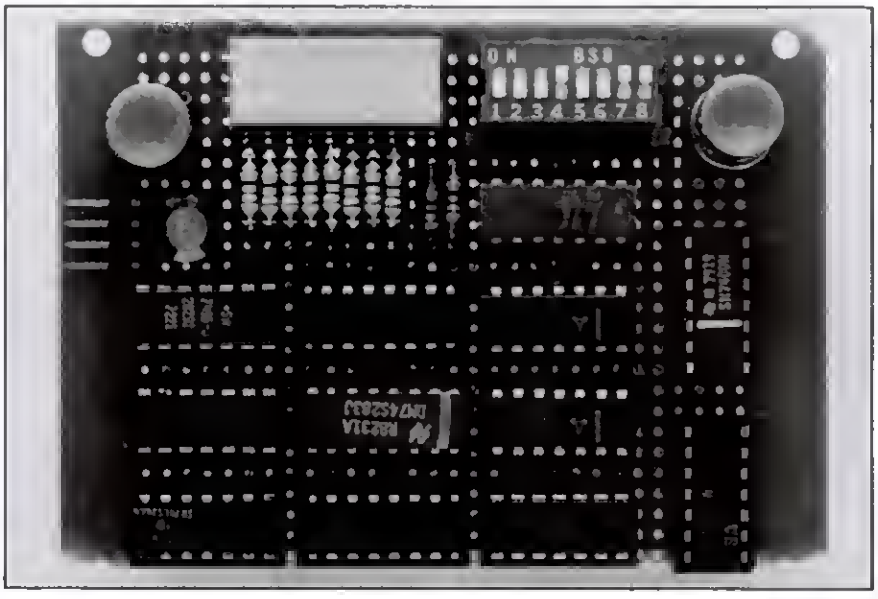

Photo 2. 4- by 4-bit parallel multiplier.

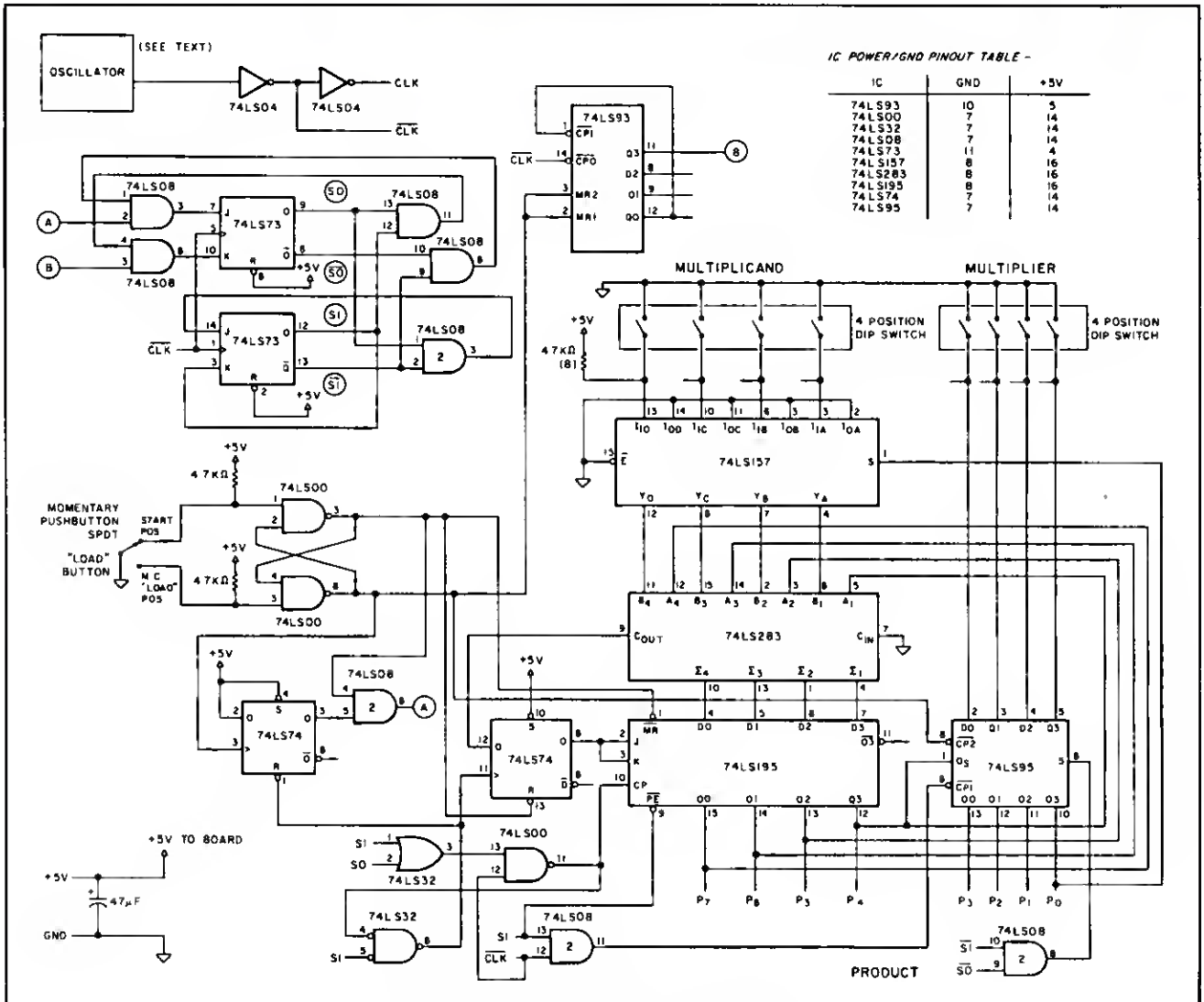

Figure 4. 4- by 4-bit sequential multiplier.

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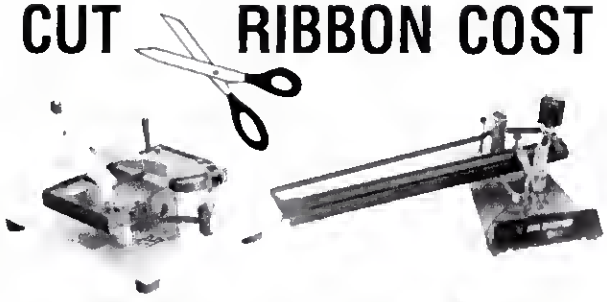

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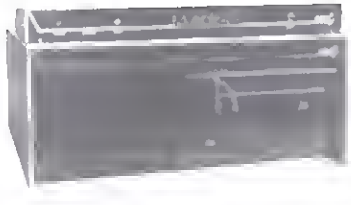

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tion process, until the processor can shift it into the AC. Figure 3 illustrates the multiplier register structure.

The computer multiplies values using this algorithm:

1. It puts the multiplier into the MQR and places the multiplicand into the MDR.
2. It sets a counter to n (for an n- by n-bit multiplication).
3. It clears the AC and Carry registers.
4. It determines if the low-order MQR bit is a 1. If not, it goes to step 6.
5. It adds the MDR value to the AC. It sets the Carry register if a carry occurs, and clears it otherwise.
6. It shifts the AC/MQR double-precision register right one bit position, shifting the Carry bit into the high-order AC bit position and shifting the low-order MQR bit out of the register. It also shifts a zero into the Carry register.
7. It decrements the counter. Is the counter zero? If not, go to step 4.
8. The multiplication is complete. The 2n-bit product is in the AC/MQR double-precision register.

As the algorithm indicates, the multiplication process consists of n add/shift sequences. As the computer shifts the AC/MQR double-precision register to the right, it puts the next-higher-order multiplier bit in the low-order MQR bit position, determining whether or not it should add a value during the next iteration of the algorithm.

A Software Approach to Multiplication

Most computers do multiplication through software. It's a simple matter to type in PRINT 45*96 in Basic and watch the result instantly appear. The Program Listing shows a Z80 Assembly-language subroutine that performs 8- by 8-bit multiplication, with a 16-bit product. The processor passes the multiplicand in the accumulator and passes the multiplier in the E register. The processor returns the product in the D/E register pair; it returns all other registers unaffected.

The subroutine follows the multiplication algorithm given above. It uses the C register as the MDR, the D register as the AC (though the actual addition takes place in the Z80's accumulator), and the E register as the MQR.

Two Hardware Approaches To Multiplication

While the software approach to multiplication is adequate for most applications, many applications still require the increased speed of hardware multiplication. Even processors with internal multiply and divide instructions can often benefit from faster multiplication or division circuitry. While about 1 percent of the run-time instructions executed in such systems involve multiplication and division, they typically use about 10 percent of the processing time.

Two hardware approaches exist for multiplication: the sequential multiplier and the parallel (combinational) multiplier. The sequential multiplier is by far the more common and economical. All microprocessors with internal multiplication instructions use this approach, as do math coprocessors and slave processors.

I'll discuss each of the hardware approaches below and describe a 4- by 4-bit multiplier to illustrate how they work.

The Sequential Multiplier

The sequential multiplier implements the multiplication algorithm described above in hardware. A state machine specifies each operation of the sequential circuit. The circuit also consists of a synchronizing clock, a counter, a full-adder, and some shift registers, along with some miscellaneous support circuitry.

Figure 4 shows the schematic diagram for a 4- by 4-bit sequential multiplier (see Parts List 1). The completed circuit appears in Photo 1. You can also choose options for the oscillator (see Fig. 5). Since I designed this board for illustration, I suggest option A because it lets you single-step through the multiplication process, one clock cycle at a time. This is done by using a momentary contact SPDT button switch, the same type of switch used for the Load function. I used light-emitting diodes (LEDs) for displaying the products (see Fig. 6). Note that an LED goes on for a zero value.

You'll notice two four-position DIP (dual in-line package) switches in Fig. 4, one for the multiplier and one for the multiplicand. When you press the load button, the processor loads the multiplier into the 74LS95 shift register (used as the MQR). It also clears the 74LS195 (used as the AC) and the 74LS74 (used as the Carry regis-

Qty.	Description	Dist.	Part number	Price each
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2	74LS00 quad two-input and gate (LS TTL) IC*	JDR	74LS00	.24
2	74LS08 quad two-input and gate (LS TTL)	JDR	74lS08	.28
1	74LS73 dual J-K flip-flop (LS TTL)	JDR	74LS73	.39
1	74LS32 quad 2-input or gate (LS TTL) IC	JDR	74LS32	.29
1	74LS195 4-bit parallel access shift register (LS TTL)	JDR	74LS195	.69
1	74LS283 4-bit full adder with fast carry	JDR	74LS283	.69
1	74LS95 4-bit shift register (LS TTL)	JDR	74LS95	.75
1	74LS74 dual d-type flip-flop (LS TTL)	JDR	74LS74	.35
2	4 position dip-switch (SPST)	RS	275-1304	1.49
10	330-ohm resistor (.25 watt)*	RS	271-1315	.08
12	4.7k-ohm resistor (.25 watt)*	RS	271-1330	.08
2	Momentary contact SPST pushbutton switch*	RS	275-1549	2.19
10	Red light emitting diode (LEDs)*	RS	276-041	.35
1	47 μF/35-volt electrolytic capacitor (PC mount)	RS	272-1027	.69
1	.1-inch matrix grid prototype board	RS	276-158	1.95

* Quantity shown assumes use of the single-cycle clock option.

Parts List 1. Parts for sequential multiplier

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3	74LS283 4-bit full adder with fast carry	JDR	74LS293	.69
8	330-ohm resistor (.25 watt)	RS	271-1315	.08
8	47 μF/35-volt electrolytic capacitor (PC mount)	RS	271-1027	.69
8	Red light emitting diode (LEDs)	RS	276-041	.35
2	4 position dip switch (SPST)	RS	275-1304	1.49
1	.1-inch matrix grid prototype board	RS	276-158	1.95

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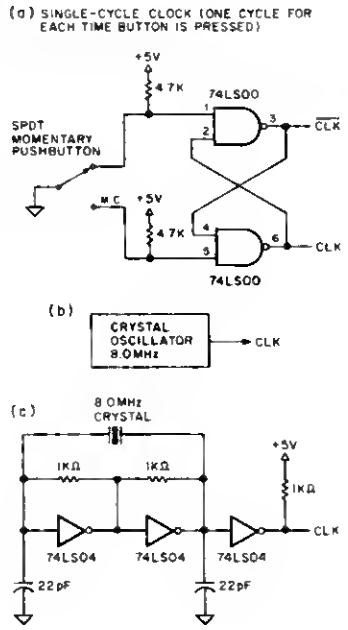

Figure 5. Oscillator clock options.

ter). When you release the button, the computer sets the A bit to indicate that it will begin multiplication. The 74LS283 4-bit full-adder does the additions, and the multiplicand DIP switches act as the MDR. Also, the 74LS93 functions as the counter. I've described the function of the 74LS157 below.

The 74LS73 J-K flip-flops are the basis of the state machine. The outputs of these flip-flops define the activity of the circuit at any given time. The three states are defined as follows:

S1	S0	Activity
0	0	Idle
0	1	Add the output of the 74LS157 to the 74LS195
1	1	Shift the Carry/74LS195/74LS95 register right one bit position

If you use the single-cycle clock approach, you'll find it especially helpful to connect the S0 and S1 signals to light-emitting diodes to show the current system state. At power-up, you should step the clock until you reach the 00 idle state. At this point, the computer should set the binary numbers you want multiplied on the DIP switches (a closed switch represents a zero bit) and you should push the load button to initialize the circuit. After you release the button, the next clock cycle changes the state from 00 to 01. It takes eight clock cycles to complete the multiplication. Afterwards, the 8-bit product appears on the outputs of the 74LS195/74LS95 double-precision register and the state machine returns to idle.

The circuit deviates slightly from the multiplication algorithm given earlier. Instead of skipping the addition with a

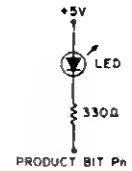

Figure 6. Connect product output bits to LEDs for display (LED is lit when Pn is low).

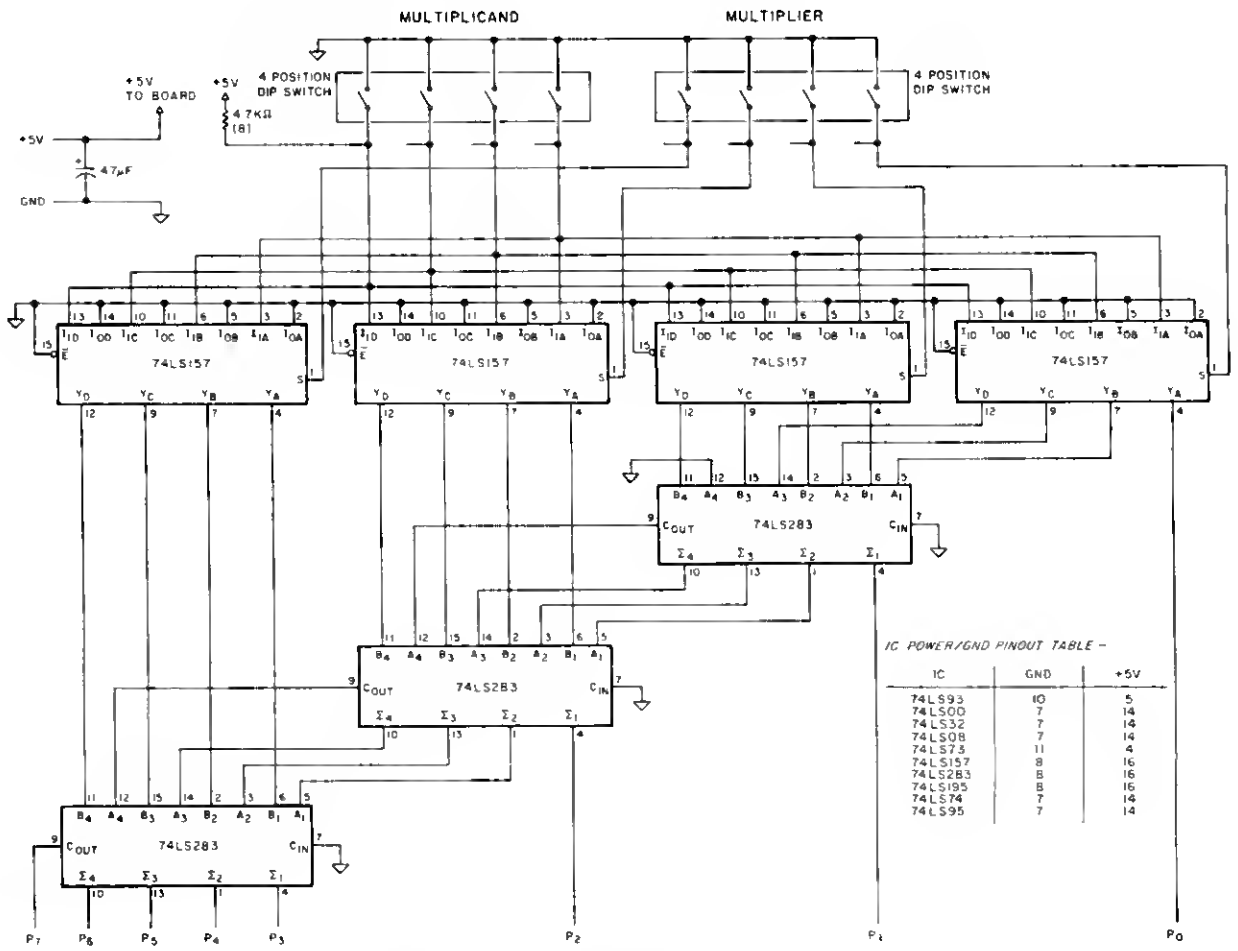

Figure 7. 4- by 4-bit combinational multiplier.

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low-order MQR bit of zero, the computer switches the outputs of the 74LS157 to the value zero (instead of the multiplicand value) and then adds zero to the current 74LS195 value; it also clears the Carry register (74LS74).

The algorithm given earlier would require at most n (but generally fewer) additions for the multiplication. In the circuit in Fig. 4, however, the algorithm always makes n additions, though sometimes it adds only the value zero.

It would, of course, be better to include the additional circuitry needed to follow the algorithm given earlier precisely, since this would take fewer clock cycles (on the average) and since speed is the name of the game. For illustrative purposes, however, the circuit in Fig. 4 works well.

The Parallel Multiplier

The parallel multiplier approach is much faster than the sequential multiplier although the parallel system requires more circuitry (see Photo 2). This approach involves the use of combinational logic and requires no synchronization clock. This approach merely extends the multiplication algorithm using additional hardware for the successive shifts and additions, instead of doing these operations sequentially.

Figure 7 shows the schematic for a 4- by 4-bit parallel multiplier (see Parts List 2). As shown, it has four 74LS157 quad 2-to-1 switches at the top. The inputs to each of these switches are identical, except the select (S) inputs, on pin 1. Each select input connects to a bit of the multiplier, with the low-order multiplier bit selecting the far right 74LS157 input, and the high-order multiplier bit selecting the far left 74LS157.

When the select input is high (a 1) the multiplicand value appears at the outputs of the '157; when the select input is low (a zero), the value zero appears at the outputs of the '157. The low-order bit of the low-order '157 is bit zero of the product (P0). The 3 high-order bits go into a 74LS283 4-bit full-adder. The output of the second '157 also goes to the '283, and their sum appears at the output of the '283. The low-order sum bit is then bit 1 of the product (P1), and the three high-order sum bits, plus the carry, go into the next '283, along with the outputs of the next '157. This process continues through the third full-adder, which provides the 5 high-order product bits.

You should note how the output of one stage is the input to the next stage, which the processor shifts left one bit position. Since there is a full-adder at each stage, the computer makes shifts and adds by the logic configuration. The multiplication time, then, results from merely the propagation delays through the chips. Using LS devices, the typical multiplication time is around 50 nanoseconds. This time drops to just a few nanoseconds when you use high-speed logic.

While the sequential multiplier circuit is more complex than the parallel multiplier, it is more useful with practical word sizes (e.g., 16- by 16-bit multipliers). The sequential circuit would require wider shift registers and a wider adder (and a carry look-ahead generator). The parallel multiplier, however, not only requires wider switches and adders, but many more of them (n 2-to-1 switches and n-1 adders). You can, however, get parallel multiplier chips from companies like TRW.■

Program Listing. Subroutine for an 8- by 8-bit multiplication with a 16-bit result.

```
                ;*****************************************************
                ; This subroutine performs an 8 X 8-bit multiplicetion  *
                ; giving a 16-bit result. The multiplier is passed in   *
                ; the E register, and the multiplicand is passed in the *
                ; A register (accumuletor). The 16-bit product is       *
                ; returned in the DE register pair. All other Z80      *
                ; registers are returned unchenged. The register usage  *
                ; is as follows:                                        *
                ;       B register --> acts as the loop counter.       *
                ;       C register --> acts as the MDR.                *
                ;       D register --> acts as the AC.                 *
                ;       E register --> acts as the MQR.                *
                ;       Carry flag --> acts as the Carry register.     *
                ; Note that all additions actually take place in the    *
                ; Z80's accumulator.                                    *
                ;                                                       *
                ; Written by: Roger C. Alford                           *
                ;*****************************************************
                ;
FF00            ;       ORG     0FF00H
                ;
FF00 C5         NLTPLY  PUSH    BC              ;SAVE THE BC REGISTER
                                                ; PAIR TEMPORARILY ON THE
                                                ; STACK.
FF01 4F                 LD      C,A             ;PLACE THE MULTIPLICAND
                                                ; INTO THE C REGISTER,
                                                ; USED AS THE MDR.
FF02 0608               LD      B,8             ;SET THE LOOP COUNTER FOR
                                                ; 8 ITERATIONS, SINCE WE
                                                ; ARE DOING AN 8 X 8-BIT
                                                ; MULTIPLICATION.
FF04 1600               LD      D,00H           ;CLEAR THE D REGISTER,
                                                ; USED AS THE AC.
FF06 07         MPLYLP  RR      A               ;CLEAR THE EARRY FLAG
FF07 CB43               BIT     0,E             ;IS THE LOW-ORDER MQR BIT
                                                ; SET?
FF09 2003               JR      Z,NOADD         ;IF NOT, DO NOT ADD --
                                                ; BRANCH BELOW FOR THE
                                                ; DOUBLE-PREC. SHIFT.
FF0B 7A                 LD      A,D             ;OTHERWISE ADD THE MDR
                                                ; TO THE CURRENT AC.
                                                ; FIRST PLACE THE AC
                                                ; VALUE INTO THE Z80'S
                                                ; ACCUMULATOR.
FF0C 81                 ADD     A,C             ;ADD THE MDR VALUE TO THE
                                                ; AC VALUE. THE CARRY
                                                ; ALSO REFLECTS THE CARRY
                                                ; CONDITION.
FF0D 57                 LD      D,A             ;PLACE THE NEW AC VALUE
                                                ; BACK INTO THE D (AC)
                                                ; REGISTER.
FF0E CB1A       NOADD   RR      D               ;DO A DOUBLE-PRECISION
                                                ; RIGHT SHIFT. FIRST
                                                ; ROTATE THE AC REGISTER,
                                                ; WITH THE CARRY GOING
                                                ; INTO AC BIT 7. AC BIT
                                                ; 0 GETS PLACED INTO THE
                                                ; CARRY REGISTER.
FF10 CB18               RR      E               ;NOW COMPLETE THE SHIFT,
                                                ; BY ROTATING THE CARRY
                                                ; INTO MQR BIT 7, AND
                                                ; MOVING ALL OTHER BITS
                                                ; DOWN.
FF12 10F2               DJNZ    MPLYLP          ;DECREMENT THE COUNTER.
                                                ; IF NOT YET ZERO, LOOP
                                                ; AGAIN TO 'MPLYLP' FOR
                                                ; THE NEXT ITERATION.
FF14 79                 LD      A,C             ;PLACE THE MULTIPLICAND
                                                ; BACK INTO THE Z80'S A
                                                ; REGISTER FOR RETURNING.
FF15 C1                 POP     BC              ;RESTORE THE BC REGISTER
                                                ; PAIR FROM THE STACK.
FF16 C9                 RET                     ;MULTIPLICATION DONE --
                                                ; RETURN TO THE CALLING
                                                ; ROUTINE.
                ;
                ;END OF SUBROUTINE: MLTPLY.
0000            ;       END
```

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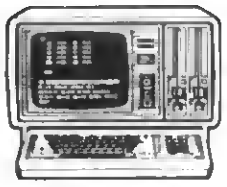

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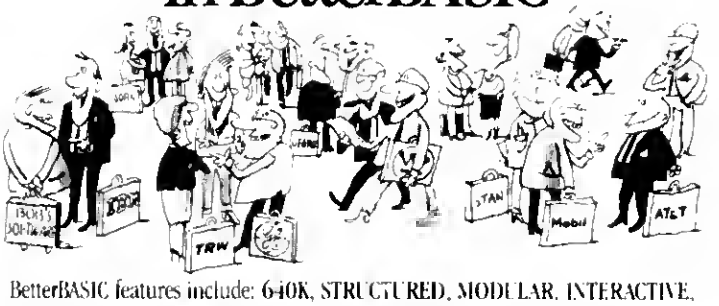

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Tracking MS-DOS: The 1000 and Other Species

I didn't name this column. In fact, I didn't like the idea. I am, after all, a modest person. I argued with my boss. I even appealed to his self-interest, pointing out that he could never get rid of *me* as long as the column continued. "I can always find another guy named Dave," he replied.

The subject is Tandy's MS-DOS machines. I'll focus on the 1000, because I use one and am comfortable with it, but I'll also discuss the 2000. The 1200 will receive the least treatment because it's the most IBM PC-compatible and has the fewest idiosyncracies. In spite of the title, I'll range beyond MS-DOS itself, and cover such topics as GW-Basic and commercial software and hardware.

I'll provide hints, tips, and advice that will help you get more out of your machine and, perhaps, give you some intellectual satisfaction. I'll discuss both Basic and 8088 Assembly-language programming. I'll also pass along my experiences with significant and interesting MS-DOS products. For instance, I'm eager to find out how the MS-DOS version of Powersoft's Super Utility compares with the Norton Utilities.

I expect to spend much of my time experimenting and playing. However, I'm hoping that *80 Micro* readers will provide much of the material that goes into the column. Your problems, suggestions, and hints will be my guidelines. What information do you need? What bugs are driving you crazy? What products impress you the most? I'll try to solve some problems, but I also expect to hear from readers who have solutions to pass on. I can't provide financial reward for hints and patches, but I'll give you credit in print.

Printer Praxis

In my June article on the Model 1000 ("The Tandy 1000 Tip Sheet," p. 38), I reported that the Okidata Microline 80

System Requirements

Models 1000, 1200, and 2000
GW-Basic

Program Listing 1. A sample Assembly-language routine written with Debug.

```
N SCREEN.COM
A
MOV  AX,0600          ;SCROLL UP, BLANK ALL
MOV  CX,0000          ;UPPER LEFT CORNER OF SCREEN
MOV  DX,184F          ;LOWER RIGHT CORNER OF SCREEN
MOV  BH,1F            ;BRIGHT WHITE ON BLUE BACKGROUND
INT  10               ;BIOS VIDEO INTERRUPT
MOV  AH,4C            ;TERMINATE PROCESS
INT  21               ;DOS FUNCTION CALL INTERRUPT

RCX
11
W
Q
```

End

Program Listing 2. A demonstration of the Sound statement.

```
10 CLS : SOUND ON : PLAY "MF"
20 ON KEY(13) GOSUB 110
30 ON KEY(14) GOSUB 130
40 ON KEY(15) GOSUB 150
50 ON KEY(16) GOSUB 170
60 FOR I = 13 TO 16 : KEY(I) ON : NEXT I
70 T = 200 : V = 1
80 SOUND T,1,V
90 LOCATE 10,35 : PRINT RIGHT$("    " + STR$(T),5);
100 GOTO 80
110 T = T + 15 : IF T > 16000 THEN T = 16000
120 RETURN
130 V = V - 1 : IF V < 1 THEN V = 1
140 RETURN
150 V = V + 1 : IF V > 15 THEN V = 15
160 RETURN
170 T = T - 15 : IF T < 1 THEN T = 1
180 RETURN
```

End

Illustration by Vinoy Laughner

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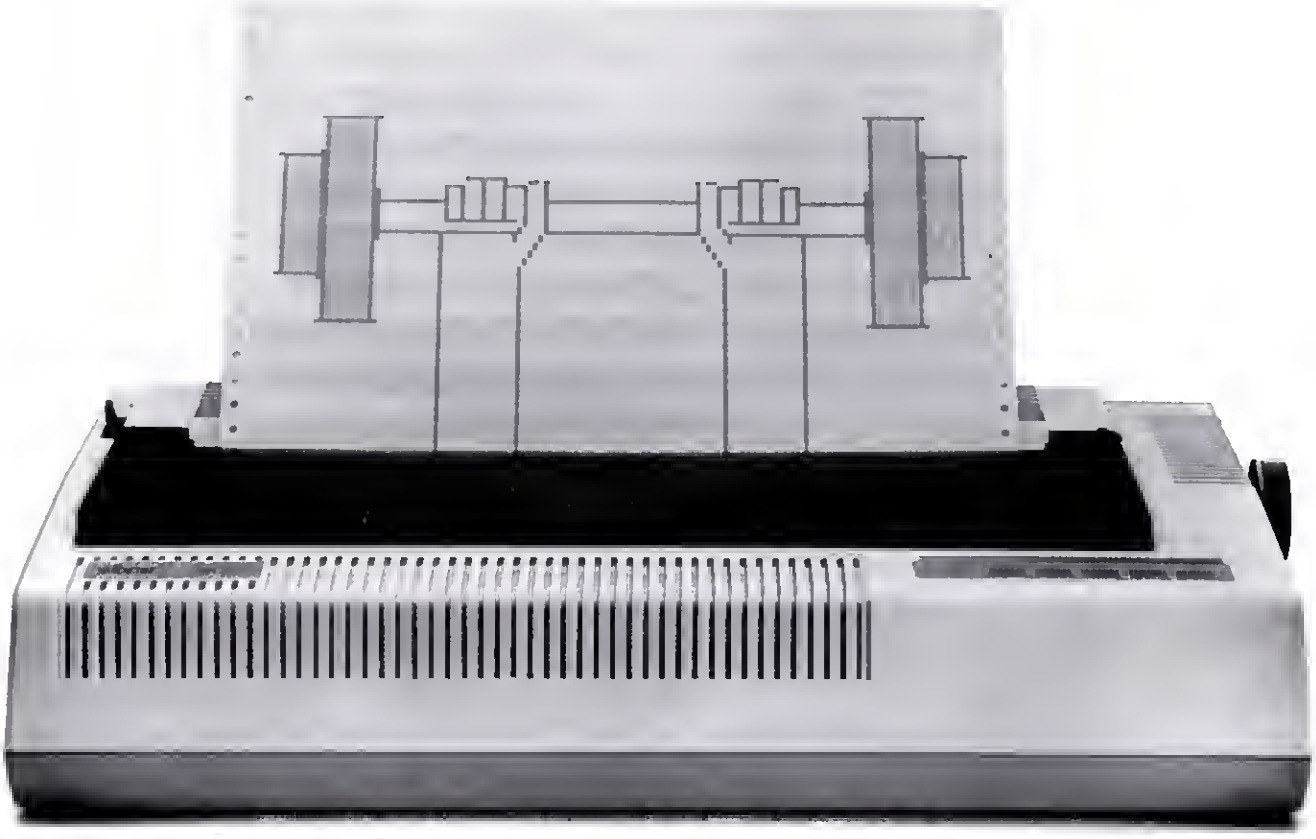

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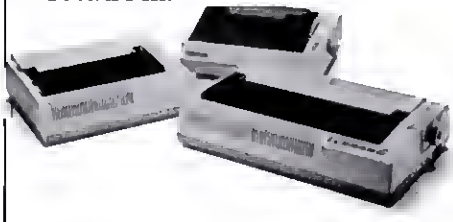

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Program Listing 3. A demonstration of the Play statement.

```
10 ON PLAY(2) GOSUB 1000
20 PLAY ON
30 PLAY "MBMST255O2EFBA"
50 PRINT "Just for Show ";
60 GOTO 50
1000 PLAY "EFBAEFBAEFBAEFBAEFBA"
1010 RETURN
```

End

blew out the 1000's printer port. I subsequently received a fix from Jay Wyrick of Hollywood, FL. If you're comfortable wires on your printer's circuit boards, the modification is easy to make. It's also the method Okidata suggests. Tandy service centers can do the modification for you, too.

You eliminate the offending high voltages on pins 34 and 36 by cutting wire S6 and a lead to resistor R17. You can see both points from the back of the printer, to the left of the Centronics plug opening. Supposedly, the printer will function as usual with other computers.

I've heard of at least one use for the printer driver (LPDRVR.SYS) that comes on the 1000 DOS disk. Tom Siriani of Hillsboro, OR, discovered that having this driver installed as a device in the CONFIG.SYS file solved the "Out of paper" error when printing lines longer than 80 columns in Basic. (The other known solution is to use the Width statement: e.g., Width Print 255.)

Should you use the 1000 printer driver? I don't; I played with it using Basic to send control codes, and wasn't impressed. The DMP-120 with driver installed acted just like my Okidata 82A with or without the driver installed. It's definitely doing something because I could print and list lines longer than 80 columns with either printer.

I would be interested to hear from anyone who finds the driver useful. You can replace codes in its character translation table from Basic or from machine language (with an INT 17H, the Basic input/output system [BIOS] printer interrupt).

People's Assembler

If you can't afford an assembler and would like to try machine language, you already have the tools, EDLIN and Debug. This is how I've been managing: the small assembler in Debug is fine for short routines. I write source files with EDLIN (or a word processor) and use input/output redirection to force Debug to assemble the source file to an object file.

You can write Assembly-language code right in Debug, on the fly, but the trick is to have it assemble from a file that you can edit later. The text file must have all the keystrokes you would normally use in an assembling session with Debug. Program Listing 1 is a small program that changes the screen to blue with bright white letters.

Type in EDLIN SCREEN.SRC and enter the text as listed, even the blank line. The first line names the output file (a .COM file), the second line starts assembly. Assembly continues up until the empty line, whose sole purpose is to end assembly.

The semicolons start comments that you can ignore, as does the assembler. This small program uses the BIOS video interrupt to set the whole screen as a window and null it with the white-on-blue attribute.

The RCX lets you change the contents of the CX register, which holds the number of bytes the program will write to disk. The W makes the program write all 11H bytes of assembled code to the file Screen.COM. Q is for Quit. To assemble the source file, type in:

```
DEBUG <SCREEN.SRC
```

Debug takes its input from the source file instead of the standard input (the keyboard). When you first write the source code, you must guess at all relative jump addresses and the number of bytes to put in CX.

I make a first pass, pressing the hold key when I want to make note of what a jump address should be and the number of bytes involved. I then edit the source file and reassemble. With complex routines, I make several passes, especially if a relative jump instruction suddenly becomes a byte longer. Then I have to debug.

Basic Sounds

I was experimenting with the GW-Basic Sound statements recently. You definitely need to learn a few things if you're used to the Sound statement on the Model 4 or 2000. The 1000's Basic sound has a range of 110 Hz to above hearing with adjustable volume on three voices (like the late PCjr). The Tandy 1000 Basic manual has the value ranges and polarities for the tone and duration parameters mixed up or just wrong. (The more I use this manual, the madder I get.)

Program Listing 2 demonstrates the abilities of the Sound statement. The up- and down-arrow keys raise and lower the tone, while the left- and right-arrow keys lower or raise the volume (on the 1000 only). The program displays the present tone value in the middle of the screen. The arrow keys act through On Key event-trapping (see 1000 Basic article). The Sound On in line 10 is necessary. The "MF" puts the sound in the foreground.

On the 1000, you also get a Noise command (six types) and the Play command. The Play statement takes a string argument with up to 32 notes or rests. The variety of string arguments provides flexibility, and Tandy implemented them so that musicians can feel comfortable using them. You can play music as a background task while a program does other things. To facilitate this process, Basic provides event-trapping for the number of notes left in the music buffer. When it's near empty, an interrupt subroutine can refill the buffer.

Program Listing 3 shows how to use the Play statement with event-trapping to play music in the background as other program lines execute. Line 10 sets event-trapping to trigger with two notes left in the music buffer. You should adjust this value to the complexity of the foreground task. If it involves uninterruptable graphics that take a while to execute (like filling a large area with the Paint statement), you'll want to set the buffer trip level higher. However, setting the On Play() parameter higher means more frequently interrupting the foreground task. In the present case, a value of 1 in line 10 produced a noticeable break in the flow of the "music."

The string in line 30 sets the music in the background, as staccato, at the highest tempo and the second octave, then starts things off with the notes E, F, B, and A. The subroutine replenishes the music buffer with several repetitions of these four notes; they repeat endlessly while the screen fills with the text in the loop from lines 50–60. When the subroutine is active, screen printing halts momentarily, but the music plays without pause.

Program Protection

How much can you protect Basic programs from tampering or copying? The Save command has a protect option (Save "File",P) that saves a Basic program in an encoded binary format. The file is then protected from tampering, as you can't list, edit, or merge it. You can, however, load, run, or chain the program, as well as copy it. What more can be done?■

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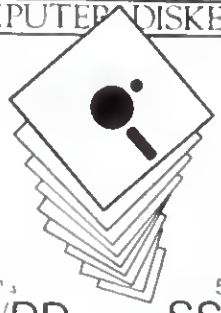

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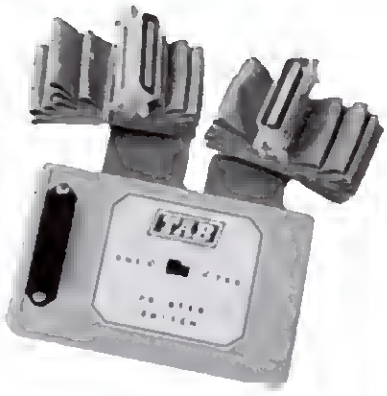

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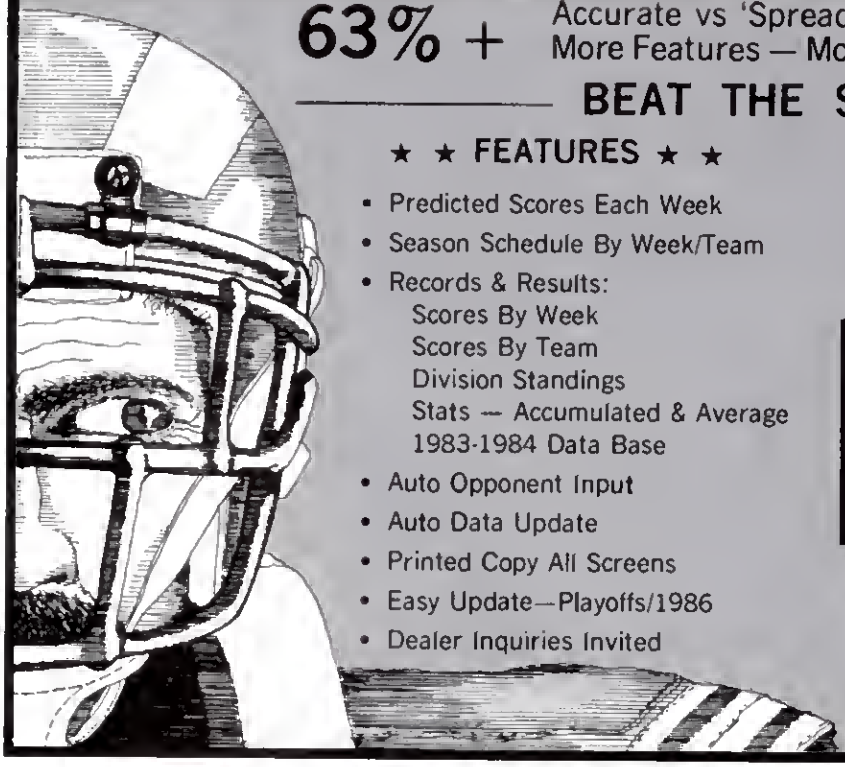

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Good Form: A Close Look At Basic Program Structure

Like a story, a game of chess, or life itself, a Basic program has a beginning, middle, and an end. As you evolve as a programmer, your efforts become more intellectually complex, and you start to recognize the events and rhythms that mark these stages in a program.

For the sake of nonargument, suppose that Basic programs have only four fundamental forms, with these names:

Arrow—Linear in form, this Basic program shoots straight through its lines once and ends.

Skipper—This one jumps back and forth among line numbers.

Crucible—It returns again and again to one or more central testing areas whose products are sliced, diced, molded, and folded into results.

Choice—This type features a menu format in which you decide what part of the program to use. Choices lead to and from modular units, which you can think of as small crucibles within the main program.

I've listed these four program forms in the order in which most of us learn to use them. All require a start, middle, and end. Figure 1 shows a template that lumps subevents of these stages. I've keyed brief explanations to the line numbers in the template. The beginning of the program is its foundation.

•100—A remark line or lines. Traditional uses: Giving the program name, computer system, and memory requirements; author's name and address; copyright statement; and restrictions on use. You can run the program without this line.

•110—Data line. You don't need this line if you're not giving variable arrays values. It can go anywhere in the program but it traditionally comes first.

•120—CLS to clear the screen. Not necessary, but it's neat programming practice to start with a clean slate.

•130—A simple Clear statement sets nu-

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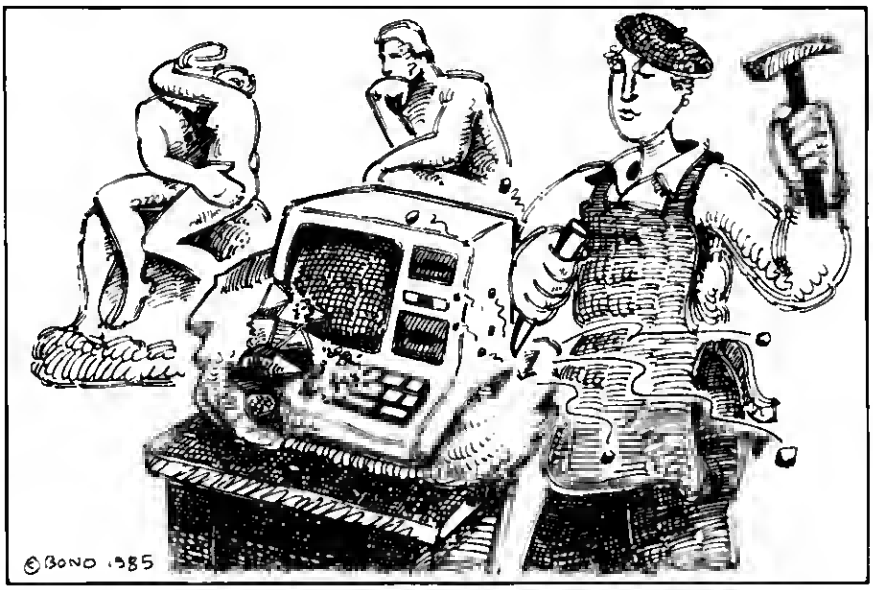

Illustration by Peter Bono

Program Listing 1. Job Aptitude Test.

```
100 REM * Job Aptitude Test * Model 4/4P
110 CLS
120 CLEAR
130 DIM B(2)
140 PRINT "Answer preference as 1 or 2, press enter."
150 INPUT "1-Shoveling 2-Typing";Z
160 IF Z<>1 AND Z<>2 THEN CLS: GOTO 150
170 B(Z)=B(Z)+1
180 CLS
190 INPUT "1-Flower 2-Wrench";Z
200 IF Z<>1 AND Z<>2 THEN CLS: GOTO 190
210 B(Z)=B(Z)+1
220 CLS
230 IF B(1)>B(2) THEN PRINT "Gardening or forestry await you."
240 IF B(2)>B(1) THEN PRINT "Try auto parts inventory."
250 IF B(1)=B(2) THEN PRINT "Write poetry."
260 END
```

End

Program Listing 2. Gumball Route.

```
100 REM * Gumball Route * Model 4/4P
110 DATA A,B,C,D,E,F
120 CLS
130 CLEAR
140 DEFSTR A-D
150 DIM A(6)
160 FOR X=1 TO 6
170 READ A(X)
180 NEXT X
190 RANDOM
200 MIL=500
210 D="A"
300 REM A ----------
310 IF LEN(D)>5 THEN 1000
320 R=RND(2)
330 IF R=1 THEN T=T+10: D=D+"B": GOTO 400
340 T=T+12: D=D+"F": GOTO 800
400 REM B ----------
```

Listing 2 continued

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Listing 2 continued

```
410 R=RND(4)
420 IF R=1 THEN T=T+10: D=D+"A": GOTO 300
430 IF R=2 THEN T=T+3: D=D+"F": GOTO 000
440 IF R=3 THEN T=T+2: D=D+"E": GOTO 700
450 T=T+0: D=D+"C": GOTO 500
500 REM C ----------
510 R=RND(3)
520 IF R=1 THEN T=T+0: D=D+"B": GOTO 400
530 IF R=2 THEN T=T+7: D=D+"D": GOTO 600
540 T=T+5: D=D+"E": GOTO 700
600 REM D ----------
610 R=RND(3)
620 IF R=1 THEN T=T+7: D=D+"C": GOTO 500
630 IF R=2 THEN T=T+0: D=D+"E": GOTO 700
640 T=T+6: D=D+"F": GOTO 000
700 REM E ----------
710 R=RND(4)
720 IF R=1 THEN T=T+5: D=D+"C": GOTO 500
730 IF R=2 THEN T=T+2: D=D+"B": GOTO 400
740 IF R=3 THEN T=T+1: D=D+"F": GOTO 000
750 T=T+8: D=D+"D": GOTO 600
000 REM F ----------
010 R=RND(4)
020 IF R=1 THEN T=T+6: D=D+"D": GOTO 600
030 IF R=2 THEN T=T+1: D=D+"E": GOTO 700
040 IF R=3 THEN T=T+3: D=D+"B": GOTO 400
050 T=T+12: D=D+"A": GOTO 300
1000 FOR X=1 TO 6
1010 IF INSTR(D,A(X))=0 THEN 320
1020 NEXT X
1030 IF T=<MIL THEN NIL=T: PRINT T;D
1040 D="A"
1050 T=0
1060 GOTO 300
1070 END
```

End

Program Listing 3. Interest.

```
100 REM * Interest * Model 4/4P
110 CLS
120 CLEAR
130 PRINT "INTEREST"
140 PRINT "This progrsm figures interest on an investment
compounded daily"
150 PRINT "and prints total st end of every 30 days."
160 PRINT
170 IMPUT "Type amount invested and press enter";A
180 INPUT "Type annusl interest (10 for 10 percent, for
 example) and press enter";I
190 INPUT "Number of days until withdrawal planned";N
200 I=I/100/365
210 FOR X=1 TO M
220 A=A+A*I
230 IF X/30=INT(X/30) THEN PRINT "Month"X/30;"-"A
240 NEXT X
250 PRINT
260 PRINT "Total at end of"N"days:"A
270 END
```

End

Program Listing 4. Menu.

```
100 REM * Nenu * TRS-00 Nodel 4/4P
110 DATA Appetizer,Soup,Salad,Entree,Beverage,Dessert
120 CLS
130 PRINT @ 670,"Nenu Selection"
140 CLEAR
150 DEFSTR A,B
160 DIM A(6)
170 FOR X=1 TO 6
180 READ A(X)
190 NEXT
200 PRINT @ 990,"Tap a key to continue."
210 Q$=INKEY$
220 IF Q$="" THEN 200
230 CLS
240 PRINT "Categories:"
250 PRINT "-----------"
260 FOR X=1 TO 6
270 PRIMT X;"- "A(X);TAB(20);B(X)
280 NEXT X
290 PRINT STHING$(40,"-")
```

Listing 4 continued

meric variables to zero and string variables to nulls. The Clear statement offers options I won't go into because you don't need them at this stage.

•140—Define statements restrict variables to certain uses. Two examples are DEFSTR, as in DEFSTR A, which defines a letter as a string without that pesky dollar sign (e.g., A = "clown"), and DEFINT, as in DEFINT B, which thereafter makes a variable's value an integer of any fractional result.

•150—You can dimension arrays after you define them; for example, DIM A(20).

•160—Your program should read in array values at this point; for example, FOR X = 1 TO 20:READ Z$(X):NEXT X.

•170—This is a good place to set all beginning values of variables; for example, M = 20.20:L$ = "line".

•180 and 190—The title and instructions are up to you, but they are well placed as the final events in program start-up. Your first program was probably of the arrow form, which generally runs straight through its lines and waits like a smug puppy to perform again:

```
100 REM *My First Program
110 PRINT "Look, Ma, I'm dancing!"
120 END
```

That same form can have its pragmatic uses, if it yields some result. See Program Listing 1, Job Aptitude Test. It's a tongue-in-cheek test, but it does illustrate the form: a series of questions whose answers the program keeps track of and acts on. You might use this format to give a test with multiple-choice answers, and to gather information for forms, such as employee files, inventory records, insurance claims, and the like.

Start: Initialization
100 Data line.
120 Clear screen.
130 Clear statement.
140 Define statement(s).
150 Dimension arrays.
160 Read in array values.
170 Set variable values.
180 Title screen.
190 Instructions.

Middle: Actnation
200 The program works on data supplied by the user and/or itself.

End: Realization
210 The result of work done in the middle phase is given and the program ends.
220 Subroutines.

Figure 1. Program template.

Listing 4 continued

```
300 PRINT
310 PRINT "Tap a number to make selection."
320 Q$=INKEY$
330 IF Q$="" OR INSTR("123456",Q$)=0 THEN 320
340 PRINT
350 C=VAL(Q$)
360 ON C GOSUB 300,400,420,440,460,480
370 GOTO 230
300 PRINT "Type choice for APPETIZER and press enter."
390 INPUT B(C): RETURN
400 PRINT "Type SOUP choice and enter."
410 INPUT B(C): RETURN
420 PRINT "Select SALAD and enter."
430 INPUT B(C): RETURN
440 PRINT "ENTREE selection (and enter)"
450 INPUT B(C): RETURN
460 PRINT "Enter a BEVERAGE."
470 INPUT B(C): RETURN
480 PRINT "DESSERT selection."
490 INPUT B(C): RETURN
500 END
```

End

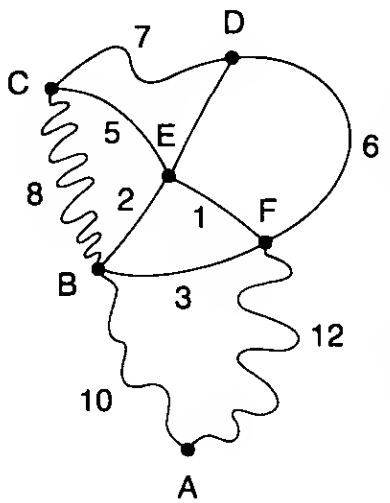

Figure 2. The map for Gumball Route.

The arrow is a simple and useful form on which a beginner can build.

The next beginner's discovery is the skipper, and programming life temporarily becomes a merry series of GOTOs. The skipper can create problems because it's tough to keep control of all the action. It demands precision and attention. Making a skipper work can be disheartening.

The example I've used, Gumball Route (Program Listing 2), is a computer solution to the problem in Fig. 2. That figure shows the mileage among six towns: A, B, C, D, E, and F. The gumball route driver's goal is to start at A, visit each site, and return to A in the shortest possible route. Traditionally, this is called the Traveling Salesman Problem. It's really critical path scheduling.

The program I've written finds the best possible answer it can by bumbling along the route. Watch the program run. Read the listing's events. I think you'll see what happens. The program will continue to search for a shorter route until you break into it to stop it. I should warn you that even mildly complex critical path simulations might take longer to produce good results than you have time to wait.

So, the arrow form of programming is simplistic and of limited effectiveness. The skipper has its charm but it's difficult to form. We come to my favorite, the crucible. It's the quintessential Basic program format. You might use hundreds of lines to set up the situation, and the crucible focuses on one small area, bringing all force to bear on one or more crucial program events.

Now that I've made it sound mystical, let me deflate myself by offering a lowly example. It's Interest (Program Listing 3). Look at lines 210–240. They contain a For. . .Next loop that prints the building result of an investment. It could loop a million times if asked. It is the crucible of the program, and it is also the result.

In studying programs written by others, look for that crucible to get a quick understanding of what happens and why. Problems with the crucible? Some programs include so many GOSUBs, If. . .Then tests, changing values, and actions that they slow run time measurably. A program performing 50 tests within a crucial area can turn a run into an ice jam.

Now for the choice. It's also called a menu program. It gives you a screen menu from which the program goes on command to a subevent—and returns to the menu. GOSUB and GOTO trigger these forays. A menu program can be speedy because it avoids program areas not needed at the moment.

Menu (Program Listing 4) is about food, but remember that the menu of Basic pertains to listing user choices, not culinary decisions. This menu about food illustrates how you can, in this case, plan a meal by adding and replacing elements. Lines 260–280 contain a loop that prints menu choices. Line 320 invites a choice from 1 to 6, and the INSTR test in line 330 prevents any answer except 1 through 6. Line 360 sends the program to the appropriate area for action. This line is a good Basic command to learn, for it shortens otherwise messy decisions.

In a more complex menu program, you might have choices to load material to and from disk, to sort, add, delete, line print items meeting tests set within the program, and more. There's always more.

I'm not claiming that these four forms encompass all of Basic programming. However, when you study program format, I think you'll find many examples that neatly fit these ideas. The four examples should give you a clue to your Basic progress. If you are just arriving at the arrow stage, take heart. The journey ahead grows more interesting. ■

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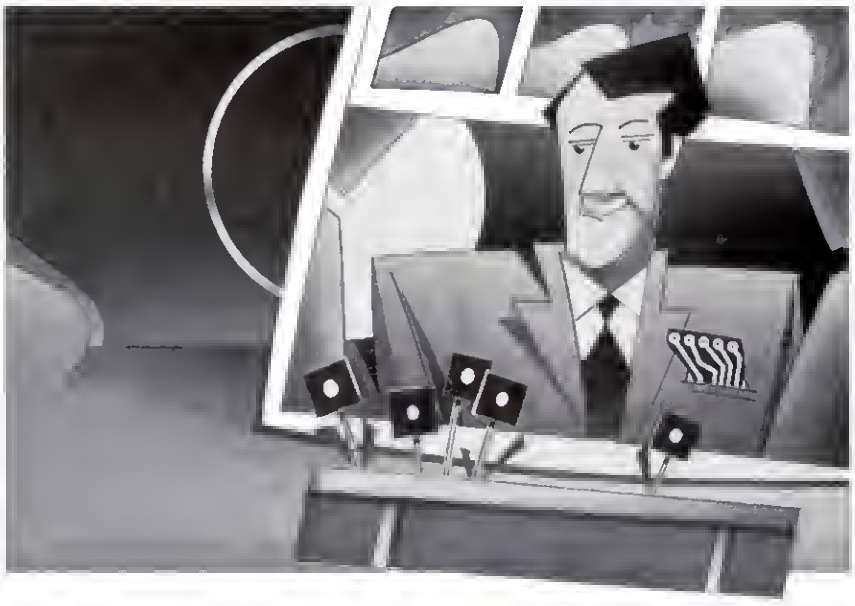

With this month's program, I'll complete my Model 4 windowing system. The Program Listing is the system's user interface: it lets you redefine a window or invoke any TRSDOS library command at any time without destroying the screen contents.

Assemble this month's program as WU/FLT. Then, provided you named the first program WD/CMD (see the June Next Step, p. 102) and last month's program WS/CMD (see p. 100), you can install the entire windowing system from the TRSDOS Ready prompt with these commands:

```
WD
WS
SET *WU WU
FILTER *KI *WU
```

The first line puts the window driver in place, the second adds the windowing supervisory call (SVC), and the last two lines link this month's user routine to the keyboard driver. As each module loads, it prints an appropriate message on the screen.

When you have all three programs up and running, you can press control-W at any time and a block of information will appear at the top of the screen telling you the row and column parameters of the present window as well as how many windows sit in an alternate memory bank.

The program gives you the option of opening a new window, closing a window and returning to the one below it, calling a DOS command, or returning to the present window and the program running there. Programs that display text with the @DSPLY and @DSP SVCs will stay within whatever windows you set. Those that transfer blocks of data directly to the screen or move the cursor to specific locations may not.

LOAD 80

System Requirements

Models 4 and 4P
128K RAM
TRSDOS 6.2
Assembly language
Editor/assembler

Program Listing. The windowing system's user interface.

```
00002 ;*****************************************************************
00003 ;
00004 ;       Windowing system -- User interface
00005 ;
00006 ;       Installation instructions:
00007 ;           SET *dv WINDOW/FLT
00008 ;           FILTER *KI *dv
00009 ;
00010 ;*****************************************************************
00011 ;
00012 ;SVCs used:
00013 @CHNIO   EQU     2@
00014 @CKBRKC EQU     106
00015 @CLS     EQU     105
00016 @CMNDR   EQU     25
00017 @DECHEX EQU     96
00018 @DSPLY   EQU     1@
00019 @EXIT    EQU     22
00020 @FLAGS   EQU     101
00021 @GTMOD   EQU     @3
00022 @HIGH$   EQU     100
00023 @KEY     EQU     1
00024 @KEYIN   EQU     9
00025 @WINDOW EQU     127
00026 ;-----------------------------------------------------------------
00027 ; Other equates:
00028 CR       EQU     @DH             ;Carriage return character
00029 LF       EQU     @AH             ;Line feed
00030 ETX      EQU     @3H
00031 ;
00032 ;-----------------------------------------------------------------
00033 ;
00034 ;  If you use EDAS or PRO-CREATE, add the following Macro definition:
00035 ;
00036 ;SVC     MACRO   @NUM
00037 ;        LD      A,@NUM
00038 ;        RST     28H
00039 ;        ENDM
00040 ;
00041 ;  Also change all uses of '.SHL.' to '<'
00042 ;    for example,     LD  BC,1.SHL.8+191
00043 ;    should become   LD  BC,1<8+191
00044 ;
00045 ;*****************************************************************
00046 ;
00047          PSECT   3000H           ;With EDAS use ORG  3000H
00048 BEGIN    JR      START           ;Set up standard header
```

Listing continued

Illustration by Phil Gersel

Circle 9 on Reader Service card.

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BUSINESS 100 PROGRAM LIST

	NAME	DESCRIPTION
1	RULE78	Interest Apportionment by Rule of the 78's
2	ANNU1	Annuity computation program
3	DATE	Time between dates
4	DAYYEAR	Day of year a particular date falls on
5	LEASEINT	Interest rate on lease
6	BREAKEVN	Breakeven analysis
7	DEPRSL	Straightline depreciation
8	DEPRSY	Sum of the digits depreciation
9	DEPRDB	Declining balance depreciation
10	DEPRDDB	Double declining balance depreciation
11	TAXDEP	Cash flow vs. depreciation tables
12	CHECK2	Prints NEBS checks along with daily register
13	CHECKBK1	Checkbook maintenance program
14	MORTGAGE/A	Mortgage amortization table
15	MULTMON	Computes time needed for money to double, triple, etc.
16	SALVAGE	Determines salvage value of an investment
17	RRVARIN	Rate of return on investment with variable inflows
18	RRCONST	Rate of return on investment with constant inflows
19	EFFECT	Effective interest rate of a loan
20	FVAL	Future value of an investment (compound interest)
21	PVAL	Present value of a future amount
22	LOANPAY	Amount of payment on a loan
23	REGWITH	Equal withdrawals from investment to leave 0 over
24	SIMPDISK	Simple discount analysis
25	DATEVAL	Equivalent & nonequivalent dated values for oblig.
26	ANNUDEF	Present value of deferred annuities
27	MARKUP	% Markup analysis for items
28	SINKFUND	Sinking fund amortization program
29	BONDVAL	Value of a bond
30	DEPLETE	Depletion analysis
31	BLACKSH	Black Scholes options analysis
32	STOCVAL1	Expected return on stock via discounts dividends
33	WARVAL	Value of a warrant
34	BONDVAL2	Value of a bond
35	EPSEST	Estimate of future earnings per share for company
36	BETAALPH	Computes alpha and beta variables for stock
37	SHARPE1	Portfolio selection model-i.e. what stocks to hold
38	OPTWRITE	Option writing computations
39	RTVAL	Value of a right
40	EXPVAL	Expected value analysis
41	BAYES	Bayesian decisions
42	VALPRINF	Value of perfect information
43	VALADINF	Value of additional information
44	UTILITY	Derives utility function
45	SIMPLEX	Linear programming solution by simplex method
46	TRANS	Transportation method for linear programming
47	EOQ	Economic order quantity inventory model
48	QUEUE1	Single server queueing (waiting line) model
49	CVP	Cost-volume-profit analysis
50	CONDPROF	Conditional profit tables
51	OPTLOSS	Opportunity loss tables
52	FQUOQ	Fixed quantity economic order quantity model
53	FQEOWSH	As above but with shortages permitted
54	FQEOQPB	As above but with quantity price breaks
55	QUEUECB	Cost-benefit waiting line analysis
56	NCFANAL	Net cash-flow analysis for simple investment
57	PROFIND	Profitability index of a project
58	CAP1	Cap. Asset Pr. Model analysis of project
59	WACC	Weighted average cost of capital
60	COMPBAL	True rate on loan with compensating bal. required
61	DISCBAL	True rate on discounted loan
62	MERGANAL	Merger analysis computations
63	FINRAT	Financial ratios for a firm
64	NPV	Net present value of project
65	PRINDLAS	Laspeyres price index
66	PRINDPA	Paasche price index
67	SEASIND	Constructs seasonal quantity indices for company
68	TIMETR	Time series analysis linear trend
69	TIMEMOV	Time series analysis moving average trend
70	FUPRINF	Future price estimation with inflation
71	MAILPAC	Mailing list system
72	LETWRT	Letter writing system-links with MAILPAC
73	SORT3	Sorts list of names
74	LABEL1	Shipping label maker
75	LABEL2	Name label maker
76	BUSBUD	DOME business bookkeeping system
77	TIMECLCK	Computes weeks total hours from timeclock info.
78	ACCTPAY	In memory accounts payable system-storage permitted
79	INVOICE	Generate invoice on screen and print on printer
80	INVENT2	In memory inventory control system
81	TELDIR	Computerized telephone directory
82	TIMUSAN	Time use analysis
83	ASSIGN	Use of assignment algorithm for optimal job assign.
84	ACCTREC	In memory accounts receivable system-storage ok
85	TERMSPAY	Compares 3 methods of repayment of loans
86	PAYNET	Computes gross pay required for given net
87	SELLPR	Computes selling price for given after tax amount
88	ARBCOMP	Arbitrage computations
89	DEPRSF	Sinking fund depreciation
90	UPSZONE	Finds UPS zones from zip code
91	ENVELOPE	Types envelope including return address
92	AUTOEXP	Automobile expense analysis
93	INSFILE	Insurance policy file
94	PAYROLL2	In memory payroll system
95	DILANAL	Dilution analysis
96	LOANAFFD	Loan amount a borrower can afford
97	RENTPRCH	Purchase price for rental property
98	SALELEAS	Sale-leaseback analysis
99	RRCONVBD	Investor's rate of return on convertable bond
100	PORTVAL9	Stock market portfolio storage-valuation program

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Listing continued

```
00049 OLDHI   DW      0               ;Save old HIGH$
00050         DB      2               ;Name length
00051         DEFM    'WU'            ;Module name
00052 MODDCB  DW      0               ;Storage space
00053         DW      0               ;Reserved for system
00054 NOW_ON  DB      0               ;Flag for current status
00055 OPREG   DB      0               ;Storage for OPREG$ image
00056 CPLAG   DB      0               ;Storage for CPLAG$ image
00057 NUM_W   DB      0               ;Storage for current # of windows
00058 OVRLY   DB      0               ;Storage for overlay number
00059 ;
00060 ;-----------------------------------------------------------------
00061 ;
00062 START   JR      C,FILTER        ;Go if @GET request
00063 ;
00064 ;  Here if @CTL
00065 ;
00066 CHAIN   LD      IX,(MODDCB)     ;Get DCB pointer from header
00067 RL01    EQU     $-2
00068         SVC     @CHNIO          ;Pass down the chain
00069         RET
00070 ;
00071 ;  Here if @GET
00072 ;
00073 FILTER  CALL    CHAIN           ;Get keystroke
00074 RL02    EQU     $-2
00075         RET     NZ              ;If no character or error
00076 ;
00077 ;  Character was received from I/O chain
00078 ;
00079         CP      17H             ;Ctrl-W ?
00080         JR      Z,MAYBE         ;Yes -- continue
00081         CP      A               ;Reset Z flag
00082         RET                     ;Back to caller
00083 ;
00084 ;  Got a Ctrl-W.  Now avoid recursion
00085 ;
00086 MAYBE   LD      A,(NOW_ON)      ;P/u current flag
00087 RL03    EQU     $-2
00088         OR      A               ;Check setting
00089         JR      Z,OKAY          ;Go if not on
00090 LEAVE   OR      1               ;Set NZ flag
00091         LD      A,0             ;No key
00092         RET                     ;And back to caller
00093 ;
```

Listing continued

If you plan to use a job control language (JCL) file to set up the window system, you should make a small change in the window driver program from June 1985. Near the end of the program, add a line just before the @EXIT SVC that returns control to TRSDOS. The new line should read LD HL,0. Without this line, the JCL thinks the program is reporting an error and aborts.

The User Interface

This month's program is a keyboard filter, with a structure similar to the one I presented in November 1984 (p. 168). The computer calls the filter every time a program asks TRSDOS for keyboard input. If you press control-W, this filter springs into action; otherwise, it passes whatever key you pressed back to the calling program.

The beginning of the program first checks to verify that you've pressed a key, then tests to see if the key is a control-W, and finally checks to ensure that you don't already have the filter running. Without this final check, chaos could result; the filter could end up calling itself over and over, unable to get back to the program that originally called it.

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Once it finishes the tests (line 96), the program sets a flag to show that it's operating. Then it saves the primary and index registers and, by using the window SVC, gets the parameters of the present window.

If the window storage area is full, control returns immediately to the calling program because you can't open any new windows. Otherwise, the program translates the present parameters into ASCII decimal and saves them in display strings. Next, the program sets up its own display window at the top of the screen, clears it, displays the command prompts, and waits for you to press one of four input keys (lines 148–159). It loops until you press a key, then jumps to the appropriate routine.

If you choose to return to the running program, the routine labeled Done (lines 161–177) closes the prompt window, restores the previous condition of the screen and the Z80's registers, then exits as it signals to the calling program that you haven't pressed a key.

The routine to close a window is also very simple. It closes the prompt window and jumps to Done to close the top user window before returning to the running program.

The other two routines are more complex. The DOS routine (lines 183–233) begins by closing the prompt window. Then it saves the current state of the C flag before setting it to allow only DOS library commands.

The DOS routine uses the @CMNDR SVC to send a command to the system for execution, but there is a fundamental problem with using that SVC from a filter. The System commands in TRSDOS use two overlay areas: SYS1–SYS5 and SYS10–SYS12 use the first, 1E00–22FF hexadecimal (hex). The library commands in SYS6 through SYS8 use the second overlay area, 2300–2FFF hex. TRSDOS stores a value at 0069 hex to keep track of the overlay currently in memory. Normally, you can use @CMNDR from a running program without problems. However, if you do so from an input/output filter, the system call might change the contents of the low overlay area. When the filter returns control to the normal input/output path, the routines it expects in the low memory will no longer be there. As a result, your system will crash, sometimes with strange sounds emanating from the internal speaker, sometimes with a frozen display, and sometimes with the disk drives running for no apparent reason.

Therefore, a filter that might cause the low overlay area to change must restore that section of memory before exiting back to the system. I'm sure there must be a way to use TRSDOS routines to per-

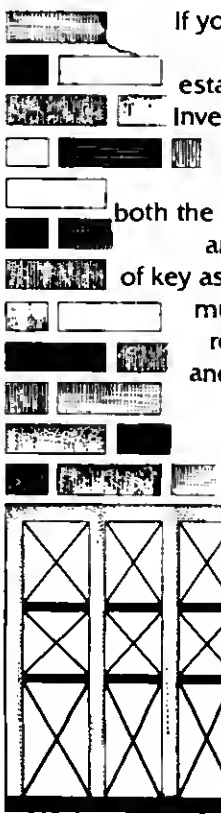
Listing continued

```
00094 ;  Got here aucceaafully with Ctrl-W
00095 ;
00096 OKAY    CPL                         ;Show that we're here
00097         LD      (NOW_ON),A          ;And atore
00098 RL04    EQU     $-2
00099         PUSH    BC                  ;Save everything
00100         PUSH    DE
00101         PUSH    HL
00102         PUSH    IX
00103         PUSH    IY
00104         LD      B,2                 ;Query preaent window
00105         SVC     @WINDOW
00106         LD      A,C                 ;Get current # of windowa
00107         CP      15                  ;Already full?
00108         JR      NC,DONE2            ;Go if no room
00109         LD      (NUM_W),A           ;Elae aave count
00110 RL05    EQU     $-2
00111         SVC     @FLAGS              ;IY ==> Flag regiatera
00112         LD      A,(IY+'O'-'A')      ;Get OPREG$
00113         LD      (OPREG),A           ;And aave in data area
00114 RL06    EQU     $-2
00115 ;
00116 ;  Save present parameters in display string
00117 ;
00118         PUSH    BC                  ;Save window count
00119         PUSH    DE                  ;Save bottom paramters
00120         LD      DE,TOPW             ;DE ==> Display area
00121 RL07    EQU     $-2
00122         CALL    PARM_DEC            ;Put in diaplay string
00123 RL08    EQU     $-2
00124         POP     HL                  ;Get bottom parametera
00125         LD      DE,BOTW             ;DE ==> Diaplay area
00126 RL09    EQU     $-2
00127         CALL    PARM_DEC            ;Put in display string
00128 RL10    EQU     $-2
00129         POP     HL                  ;Get window count
00130         LD      DE,OPNW             ;DE ==> Diaplay area
00131 RL11    EQU     $-2
00132         CALL    CONV1               ;Display value in L
00133 RL12    EQU     $-2
00134 ;
00135 ;   Set up new window and diaplay info
00136 ;
00137 OUR_W   LD      BC,1.SHL.8+191      ;Open a outline window
00138         LD      HL,0                ;Top corner = 0,0
```

Listing continued

Circle 103 on Reader Service card.

BRICKWARE



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Listing continued

```
00139           LD      DE,3.SHL.8+79   ;Bottom = 3,79
00140           SVC     @WINDOW         ;Set new window
00141 SHOW      SVC     @CLS            ;Clear screen, set 00 char.
00142           LD      HL,PROMPT1      ;HL==> Prompt message
00143 RL13      EQU     $-2
00144           SVC     @DSPLY          ;Display it
00145 ;
00146 ;   Wait for input and perform requested action
00147 ;
00148 INPUT1    SVC     @KEY            ;Get a key
00149           AND     5FH             ;Convert to upper case
00150           CP      'R'             ;Return request?
00151           JR      Z,DONE          ;Yes -- go
00152           CP      'C'             ;Close request?
00153           JR      Z,CLOSE
00154           CP      'O'             ;Open request?
00155           JP      Z,OPEN
00156 RL14      EQU     $-2
00157           CP      'D'             ;Dos request?
00158           JR      Z,DOS
00159           JR      INPUT1          ;Loop for legal entry
00160 ;
00161 DONE      LD      B,0             ;Function: close window
00162           SVC     @WINDOW
00163 DONE1     LD      A,(OPREG)       ;Get memory image
00164 RL15      EQU     $-2
00165           OUT     (84H),A         ;Re-establish
00166           LD      (IY+'O'-'A'),A  ;And reset OPREG$
00167 DONE2     XOR     A               ;A = 0
00168           LD      (NOW_ON),A      ;Store ="not here"
00169 RL16      EQU     $-2
00170           POP     IY              ;Recover all regiaters
00171           POP     IX
00172           POP     HL
00173           POP     DE
00174           POP     BC
00175           OR      1               ;Set NZ flag
00176           LD      A,0             ;No character to return
00177           RET                     ;Back to caller
00178 ;
00179 CLOSE     LD      B,8             ;Function: close window
00180           SVC     @WINDOW         ;One window closed
00181           JR      DONE            ;And leave
00182 ;
00183 DOS       LD      B,8             ;Function: close window
00184           SVC     @WINDOW         ;Close our window
00185           LD      A,(IY+'C'-'A')  ;Get CFLAG$
00186           LD      (CFLAG),A       ;Save in data area
00187 RL17      EQU     $-2
00188           SET     4,(IY+'C'-'A')  ;Only allow library commands
00189           LD      A,(0069H)       ;Get current overlay number
00190           LD      (OVRLY),A       ;and save
00191 RL18      EQU     $-2
00192           LD      HL,1E00H        ;Beginning of low overlay area
00193           LD      DE,OVRBUF       ;DE==> Temporary storage
00194 RL19      EQU     $-2
00195           LD      BC,500H         ;Bytes to move
00196           LDIR                    ;Save low overlay area
00197 ;
00198 ;   Open full-screen window
00199 ;
00200           LD      HL,0            ;Top: 0,0
00201           LD      DE,23.SHL.8+79  ;Bottom 23,79
00202           LD      BC,1.SHL.8      ;Function: open window
00203           SVC     @WINDOW         ;Open full-screen window
00204 DOSCMD    LD      HL,DOSMSG       ;HL==> Prompt
00205 RL20      EQU     $-2
00206           SVC     @DSPLY          ;On screen
00207           LD      HL,INBUF$       ;HL==> system input buffer
00208 RL21      EQU     $-2
00209           LD      BC,79.SHL.8     ;79 character maximum
00210           SVC     @KEYIN          ;Get the command
00211           JR      NZ,DOSEND       ;Go if error
00212           JR      C,DOSEND        ;  or if <break>
00213           SVC     @CMNDR          ;Process the request
00214 WAIT      SVC     @KEY            ;Wait for key stroke
00215           JR      NZ,WAIT         ;Loop if error
00216           JR      DOSCMD          ;Loop for another command
00217 DOSEND    SVC     @FLAGS          ;IY==> flag table
00218           LD      A,(CFLAG)       ;P/u old version
00219 RL22      EQU     $-2
00220           LD      (IY+'C'-'A'),A  ;Replace old version
00221           LD      HL,OVRBUF       ;HL==Temp storage
00222 RL23      EQU     $-2
00223           LD      DE,1E00H        ;Overlay area
00224           LD      BC,500H         ;Bytes to restore
00225           LDIR                    ;Restore low overlay area
00226           LD      A,(OVRLY)       ;Get old overlay number
00227 RL24      EQU     $-2
00228           LD      (0069H),A       ;Put back in OVRLY$
00229           SVC     @CKBRKC         ;Clear <break> flag
00230           LD      B,0             ;Function: close window
00231           SVC     @WINDOW         ;Return to original window
00232           JP      OUR_W           ;Back to our window
00233 RL25      EQU     $-2
00234 ;
00235 OPEN      LD      A,(NUM_W)       ;Get current window count
00236 RL26      EQU     $-2
00237           CP      14              ;Storage full?
00238           JP      NC,INPUT1       ;Yes -- get a new command
00239 RL27      EQU     $-2
00240           SVC     @CLS            ;Else clear our screen
00241           LD      HL,TOPMSG       ;HL==> message
00242 RL28      EQU     $-2
00243           SVC     @DSPLY          ;And display
```

Listing continued

form the restore, but I haven't found it yet. So, this program stores the entire low overlay area in a buffer, as well as the byte that indicates what overlay is in memory.

The remainder of the DOS routine is simple. It opens a full-screen window and prompts you for a DOS command. The routine passes that command to the system, and a loop returns for another command until you stop it by pressing the break key. Then the program restores everything in low memory to its previous state and loops back to the prompt window.

The final routine opens a new display window (lines 235–283). It clears the prompt area and asks you for the new window parameters.

The only difficult part of this section is accepting the ASCII decimal values you type in and changing them to the binary format the computer requires. The GET RC routine (lines 285–298) does most of the difficult part.

If you enter illegal values or press the break key while entering the parameters, the program returns to the prompt window for further instructions. Otherwise, it opens the new window and exits to it.

The installation section of the program (lines 360–467) does nothing tricky. This program relies on last month's windowing SVC, so it first checks to be sure you've installed that SVC. Since the user interface is a filter, it must also test to see that you used the Set command to load it.

If everything has gone well, the computer moves the main program to high memory and protects it; then the program sets its device control block to show that the filter is capable of handling @GET and @CTL commands. Finally, the initialization section reports a successful installation and returns control to TRSDOS.

Final Comments

The windowing system is the most extensive set of programs I have presented in The Next Step. Depending on your programming needs, you may want to use just the driver, the driver and windowing SVC, or all three for particular projects.

The windows work well with some programs, poorly with others. You'll have to experiment to see how they work with your Model 4 programs. If you wish, you could use the first two programs to create a system of pull-down menus. Also, with a few changes, you could use the second program to create two active windows on the screen at once.

If you develop any interesting applications with the window system, I'd enjoy seeing them on a disk, along with your source code if possible. Please re-

member that *80 Micro* owns the copyright to this windowing system: if you want to distribute any programs based on it, you'll have to take care of some legal formalities first.

A set of programs this complex probably has a bug or two in it. If you find one, write to me and describe in detail what I can do to demonstrate the bug. If you find any major bugs, I'll be sure to include patches in a future column. Please remember, however, that there's a lag time between when I write a column and when you see it. I finished this column during the first week of April. If I hear of a major bug in August, you might not read about it until early next year.■

You can contact Hardin Brothers through CompuServe. Go PCS-117 to the Writers' and Editors' SIG (WESIG) and leave your message addressed to him. Feel free to join in discussions started by others.

You can also write to Hardin at 280 N. Compus Ave., Upland, CA 91786. Enclose a stamped, self-addressed envelope if you want a reply.

Listing continued

```
00244           CALL    GET_RC          ;Get top row/column
00245 RL29      EQU     $-2
00246           JP      C,SHOW          ;Back on <break>
00247 RL30      EQU     $-2
00248           PUSH    HL              ;Save top row/col
00249           LD      HL,BOTMSG       ;RL==> bottom prompt
00250 RL31      EQU     $-2
00251           SVC     @DSPLY          ;And display
00252           CALL    GET_RC          ;Get bottom row/col
00253 RL32      EQU     $-2
00254           JR      NC,OPEN2        ;Go if no <break>
00255           POP     HL              ;Else clear stack
00256           JP      SHOW            ;Back on <break>
00257 RL33      EQU     $-2
00258 OPEN2     PUSH    HL              ;Save bottom row/col
00259           LD      HL,FRMMSG       ;RL==> frame request
00260 RL34      EQU     $-2
00261           SVC     @DSPLY          ;Display it
00262           LD      HL,INBUF$       ;HL==> DOS input buffer
00263 RL35      EQU     $-2
00264           LD      BC,3.SHL.8      ;B = maximum characters
00265           SVC     @KEYIN          ;Get frame character
00266           JR      NC,OPEN3        ;Go if no <break>
00267           POP     HL              ;Else clear the stack
00268           POP     HL
00269           JP      SHOW            ;Back on <break>
00270 RL36      EQU     $-2
00271 OPEN3     SVC     @DECHEX         ;Convert frame value
00272           PUSH    BC              ;Save frame value for later
00273           LD      B,0             ;Function: close window
00274           SVC     @WINDOW
00275           POP     BC              ;Recover frame value in C
00276           POP     DE              ;R/w bottom row/col
00277           POP     HL              ;And top row/col
00278           LD      B,1             ;Function: open window
00279           SVC     @WINDOW
00280           JP      NZ,OUR_W        ;To our window if error
00281 RL37      EQU     $-2
00282           JP      DONE1           ;Back to running program
00283 RL38      EQU     $-2
00284 ;
00285 GET_RC    LD      HL,INBUF$       ;HL==> DOS input buffer
00286 RL39      EQU     $-2
00287           LD      BC,6.SHL.8      ;B = maximum characters
00288           SVC     @KEYIN          ;Get top row/col
00289           RET     C               ;Back on <break>
```

Listing continued

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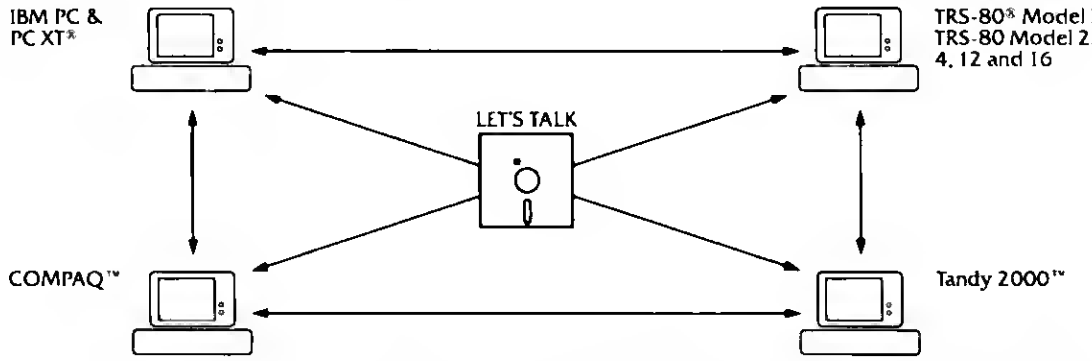

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```
00290           SVC     @DECHEX         ;Convert row to hex
00291           PUSH    BC              ;And save
00292           INC     HL              ;Skip comma
00293           SVC     @DECHEX         ;Convert column to hex
00294           LD      L,C             ;Column to L
00295           POP     BC              ;Recover row
00296           LD      H,C             ;Row to H
00297           OR      A               ;Reset Carry Flag
00298           RET                     ;And return
00299 ;
00300 ; Put present parameters in display strings
00301 ;
00302 PARM_DEC       EQU     $
00303           PUSH    HL              ;Save row/col to convert
00304           LD      L,H             ;Move row to L
00305           CALL    CONV1           ;Convert & store row
00306 RL40      EQU     $-2
00307           LD      A,','           ;Display character
00308           LD      (DE),A          ;To string
00309           INC     DE              ;Point to next area
00310           POP     HL              ;Recover row/col
00311 CONV1     LD      H,0             ;Blank H value
00312           LD      A,' '           ;Blanking space
00313           LD      B,2             ;Maximum string length
00314           CALL    06FAH           ;Into middle of @HEXDEC
00315           RET
00316 ;
00317 ;  Display messages
00318 ;
00319 PROMPT1 DEFM    'Window Commands:'
00320           DEFM    '                              '  ;29 spaces
00321           DEFM    'Current Window Settings:'
00322           DEFB    LF
00323           DEFM    '<O>pen, <C>lose, <D>os Command'
00324           DEFM    '                '                ;16 spaces
00325           DEFM    'Parameters: '
00326 TOPW      DEFM    '    / '
00327 BOTW      DEFM    '    '
00328           DEFB    LF
00329           DEFM    '  <R>eturn to previous program'
00330           DEFM    '                '                ;13 spaces
00331           DEFM    'Windows now saved: '
00332 OPNW      DEFM    ' '
00333           DEFB    CR
00334 ;
00335 DOSMSG    DEFM    '(Press <BREAK> to return)'
00336           DB      LF
00337           DEFM    'Dos command? '
00338           DB      ETX
00339 ;
00340 TOPMSG    DEFM    'New top left corner (row,col): '
00341           DB      ETX
00342 ;
00343 BOTMSG    DEFM    'Bottom right corner (row,col): '
00344           DB      ETX
00345 ;
00346 FRMMSG    DEFM    'ASCII Frame character (0 for none): '
00347           DB      ETX
00348 ;
00349 INBUF$    DS      80
00350 OVRBUF    DS      500H
00351 FLTEND    EQU     $-1             ;End of filter
00352 FLTLEN    EQU     $-BEGIN         ;Length of filter
00353 ;
00354 ;*********************************************************
00355 ;
00356 ;     Installation section
00357 ;
00358 ;*********************************************************
00359 ;
00360 INIT      PUSH    DE              ;Save DCB pntr
00361           LD      (MODDCB),DE     ;Stuff into filter
00362           LD      HL,SGNON        ;HL==> Sign-on message
00363           SVC     @DSPLY          ;Display on screen
00364           LD      DE,MODNAME      ;DE==>Window SVC name
00365           SVC     @GTMOD          ;Find SVC
00366           JR      Z,VIASET        ;Go if found
00367           LD      HL,NO_SVC       ;HL==>message
00368 ERR_OUT   SVC     @DSPLY          ;Display error message
00369           LD      HL,-1           ;Set extended error
00370           SVC     @EXIT           ;And leave
00371 ;
00372 ;   Installed with SET command?
00373 ;
00374 VIASET    SVC     @FLAGS          ;Point IY to flags
00375           BIT     3,(IY+'C'-'A')  ;Test bit 3 of CFLAG$
00376           JR      NZ,SETHI        ;Go if SET used
00377           LD      HL,SETMSG       ;HL==>"Use SET"
00378           JR      ERR_OUT         ;And leave
00379 ;
00380 ;  Reset HIGH$ and prepare to relocate filter
00381 ;
00382 SETHI     LD      BL,0            ;Get current value
00383           LD      B,L             ;B=0 >> select HIGH$
00384           SVC     @HIGH$
00385           LD      (OLDHI),HL      ;Save in filter header
00386           JR      Z,RELOC         ;Go if no error
00387           LD      HL,NOMEM        ;HL==> No memory msg
00388           JR      ERR_OUT         ;Report error & leave
00389 ;
00390 ;  Move filter to high memory and protect
00391 ;
00392 RELOC     LD      IY,RELTAB       ;IY==> Relocation table
00393           LD      DE,FLTEND       ;DE==> End of filter
00394           XOR     A               ;Reset Carry Flag
```

Listing continued

Listing continued

```
00395           SBC     HL,DE           ;Calculate distance to move
00396           PUSH    HL              ;  and transfer to
00397           POP     BC              ;  BC register pair
00398 RELOC1    LD      L,(IY+0)        ;Get address to change
00399           LD      H,(IY+1)        ;  in HL
00400           LD      A,H             ;Pick up MSB
00401           OR      A               ;Is it 0?
00402           JR      Z,MOVE          ;Yea -- go
00403           LD      E,(HL)          ;Move contents
00404           INC     HL              ;  of address to
00405           LD      D,(HL)          ;  DE reg. pair
00406           EX      DE,HL           ;HL has value to change
00407           ADD     HL,BC           ;Add the offset
00408           EX      DE,HL           ;New value back to DE
00409           LD      (HL),D          ;Put it back
00410           DEC     HL              ;  in the
00411           LD      (HL),E          ;  program
00412           INC     IY              ;Bump IY to next
00413           INC     IY              ;  entry in table
00414           JR      RELOC1          ;Repeat until done
00415 ;
00416 ;     Move module to high memory and protect
00417 ;
00418 MOVE      LD      DE,(OLDHI)      ;DE==>Destination address
00419           LD      HL,FLTEND       ;BL==>Current end of filter
00420           LD      BC,FLTLEN       ;BC = length of module
00421           LDDR                    ;Move it
00422           EX      DE,HL           ;Move new HIGH$ to HL
00423           LD      B,0             ;Select HIGH$
00424           SVC     @HIGH$          ;Set new HIGH$ value
00425           INC     HL              ;HL==>filter entry point
00426 ;
00427 ;    Set type and address in filter's DCB
00428 ;
00429           POP     IX              ;Get DCB addr off stack
00430           LD      (IX),01000101B  ;Set as FILTER capable of
00431                                   ;  @GET & @CTL
00432           LD      (IX+1),L        ;LSB of filter address
00433           LD      (IX+2),H        ;MSB of filter address
00434           LD      HL,SUCCESS      ;BL==> Succeaa message
00435           SVC     @DSPLY
00436           LD      HL,0            ;Show success
00437           RET                     ;Bact to TRSDOS via SET
00438 ;
00439 ;    Messages
00440 ;
00441 MODNAME  DEFM    'WS'            ;Window SVC module name
00442           DB      0
00443 SGNON    DEFM    'Windowing Syatem User Filter'
00444           DB      CR
00445 NO_SVC   DEFM    'Window SVC not found -- inetallation aborted'
00446           DB      CR
00447 SETMSG   DEFM    'Filter must be installed with SET command'
00448           DB      CR
00449 NOMEM    DEFM    'High memory not avsilable for installation'
00450           DB      CR
00451 SUCCESS  DEFM    'Installation succeaafully completed'
00452           DB      LF
00453           DEFM    'Use FILTER command to connect to *KI'
00454           DB      LF
00455           DEFM    'Then use <CTRL><W> to invoke window commands'
00456           DB      CR
00457 ;
00458 ;    Relocation table
00459 ;
00460 RELTAB   DEFW    RL01,RL02,RL03,RL04,RL05,RL06,RL07,RL08
00461           DEFW    RL09,RL10,RL11,RL12,RL13,RL14,RL15,RL16
00462           DEFW    RL17,RL18,RL19,RL20,RL21,RL22,RL23,RL24
00463           DEFW    RL25,RL26,RL27,RL28,RL29,RL30,RL31,RL32
00464           DEFW    RL33,RL34,RL35,RL36,RL37,RL38,RL39,RL40
00465           DEFW    0000
00466 ;
00467           END     INIT
```

End

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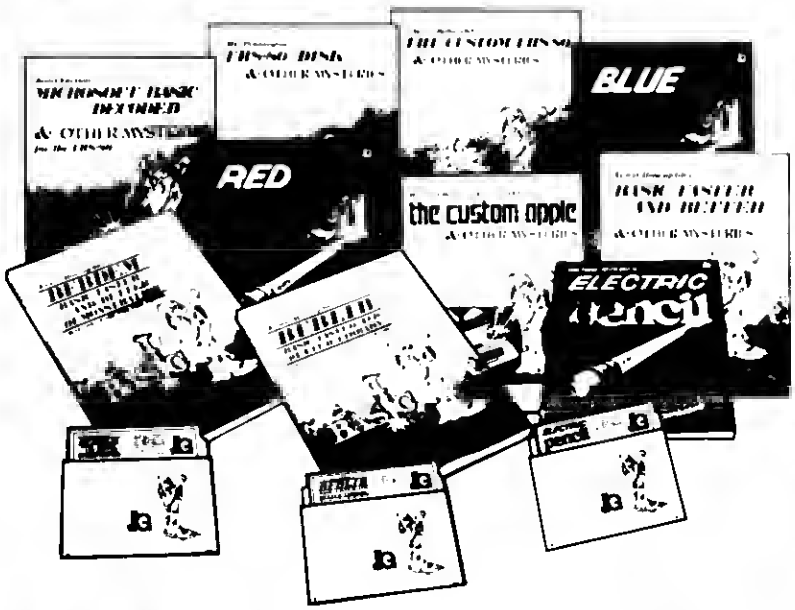

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Cash Crop: Bond Yield to Maturity

by L. H. Southmayd

While VisiCalc's built-in functions meet most of my needs, they don't handle common financial calculations like yield to maturity (YTM) or internal rate of return (IROR). These functions require solving nonlinear equations by iterative methods; that is, by trial and error. Lotus 1-2-3's @IRR function is only a partial solution; you still must guess a value to initiate the trial-and-error process.

My template, BondYTM, calculates yield to maturity for standard and zero-coupon bonds; this is the return on your investment, incorporating the interest paid and any capital gain or loss you realize when the bond matures or when you sell it.

The template uses functions available with VisiCalc and which are compatible with Lotus 1-2-3. Because BondYTM uses the secant method to solve the nonlinear equation, it's efficient and fast. Also, you don't have to supply estimated YTMs to start the calculation; the formula does that for you.

Template Features

Figure 1 shows a sample calculation. Rows 7–13 and 16 of column C represent the input area, where you enter data about the bond you're evaluating. The settlement date is when payment for the bond is due; in the sample it is Oct. 15, 1984. Note that you must enter the day, month, and year for settlement and maturity dates.

If you type in zero in the coupon (annual interest) area, the formula calculates both the conventional YTM, using semiannual compounding, and the true

	A	B	C	D	E	F	G	H
1	L. H. Southmayd		BONDYTM/VC or	BONDYTM.WKS	13 character columns			
2	27 Barclay Road			(LOTUS 123)	Row calculation			
3	Scarsdale, N. Y. 10583		914 723 9854					
4								
5		BOND YIELD TO MATURITY *						
6								
7	Settlement Date	MM.DD	10.15					
8		Year	1984					
9	Maturity Date *	MM.DD	7.01					
10		Year	1997		Days		Full 1/2 Yrs	Frac 1/2 Yrs
11	Principal Amount *		1000.00		4642		25	.435616438
12	Coupon (annual intsrsst)		98.00			Set f(YTM)=0		49
13	Price (for $1000 bond)		990.00		Initial Est	f(est YTM)=	1017.65	Secant Est
14	Plus accrueo interest		27.65		.09920271257	.55570193	.55570193	.09920271257
15	Total per bond		1017.65		.09977912613	-2.95566911	2.95566911	.0993612739
16	Number of bonds		10			-.00110244	.00110244	.09936130534
17	Total		10176.50			-.00140525	.00140525	.09936110705
18						-.00000007	.00000007	.09936110704
19	* For the yield of a called bond,					-.00000001	.00000001	.09936110704
20	add the premium, e.g., enter $1030					-.00000001	.00000001	.09936110704
21	for a bond callable at 103, and change					.00067811	.00067811	.09936110704
22	the maturity date to the called date.					-.00000001	.00000001	.09936110704
23						-.00000001	.00000001	.09936110704
24							.00000001	.09936110704
25	Bond Yield to Maturity #		9.94 %					
26	Calculated Price Check		990.00					
27								
28	# Conventional YTM (semiannual compounding)							
29	If Zero Coupon, True YTM=		NA %					

Figure 1. BondYTM template.

Illustration by Hal Mayforth

Circle 62 on Reader Service card.

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YTM. I provided this feature because I've found that some zero bond salespeople and ads don't always identify which kind of YTM they're quoting.

After you enter the coupon, price and number of bonds, type in an exclamation point to invoke the Calculate command. In 33 seconds (on a Model III), you'll see the YTM displayed on line 25.

BondYTM also calculates the accrued interest, the adjustment you must make for interest earned since the last interest payment before you bought or sold the bond.

The calculated price check tests the template's accuracy. The calculated YTM, entered automatically in the equation, should give you the bond's price.

Note that when you load the template, VisiCalc displays an error message, then recalculates. When the recalculation is complete, BondYTM is ready to use.

It Figures

The template's calculation area covers columns E–H. The calculation area has two parts: Cell E11 finds the number of days between the settlement and maturity dates, while the rest of the calculation area solves the nonlinear equation using the well-known secant method. Figure 2 shows BondYTM's formula listing.

BondYTM precalculates some variables, such as the number of full half-years and fractional half-years, in order to save computation time per step.

Column E contains the two initial estimates the secant method requires to solve the equation. The first is based on a familiar approximation of YTM. The formula sets the second estimate either ½ percent above or ½ percent below the first, depending on whether the bond's price is below or above par.

I avoid potential divide-by-zero problems by stopping the new iterations when the new estimate equals the old estimate, which is a function of the computer's accuracy. The capacity for nine iterations plus the initial guess provides ample accuracy.

This cell also contains a test for zero-coupon bonds and bonds bought at par. In these two special cases, BondYTM calculates YTM directly and quickly, bypassing all four columns and filling them with @NAs.

The calculations in column F and in cell C26 use the formula for the price of a bond on any date, not necessarily the coupon date. By industry convention, you approximate accrued interest by multiplying half the annual coupon by 1 minus the fractional half-year to the date of the next coupon payment.

The equation in column F is in the form f(x)=0 where all the variables are known except the estimated YTM, calculated by the secant method in the prior step and taken from column H. The estimated YTM becomes more accurate as f(x) approaches zero within VisiCalc's significant digits.

Column G is the absolute of column F. This part of the algorithm selects the most accurate estimated YTM in column H; that is, the estimated YTM with the lowest absolute value in column F. The @MIN function in cell G24 determines column F's lowest absolute value.

Cell H24 contains a series of chained @IF functions that determine which value in column H matches the lowest absolute value of f(x)=0 in column F. I used this particular select method to make the cell easily translatable by Lotus 1-2-3.■

```
>E11:(@INT(365.25*C10)+@INT(30.6*@INT(C9))+(C9-@INT(C9)*100))-(@INT(36
  5.25*C8)+@INT(30.6*@INT(C7))+(C7-@INT(C7)*100))
>G11:@INT(E11*2/365)
>H11:@IF((E11*2/365-G11)<.02,0,(E11*2/365-G11))
>H12:+C12/2
>G13:/FS+C13+(H12*(1-H11))
>C14:@INT(H12*(1-H11)*100+.5)/100
>E14:@IF(C12=0,@NA,@IF(C13=1000,@NA,C12+(C11-C13*365/E11)/((C13+C11)/2
  ))
>F14:-G13+((C12/E14*(1-((1+(E14/2))^-G11))+(C11/((1+(E14/2))^G11)+H12)
  /((1+(E14/2))^H11))
>G14:@ABS(F14)
>H14:+E14
>C15:+C13+C14
>E15:@IF(C13<C11,E14*1.005,E14*.995
>F15:-G13+((C12/E15*(1-((1+(E15/2))^-G11))+(C11/((1+(E15/2))^G11)+H12)
  /((1+(E15/2))^H11))
>G15:@ABS(F15)
>H15:@IF(E15=0,0,E15-(F15*(E15-E14)/(F15-F14))
>F16:-G13+((C12/H15*(1-((1+(H15/2))^-G11))+(C11/((1+(H15/2))^G11)+H12)
  /((1+(H15/2))^H11)))
>G16:@ABS(F16)
>H16:@IF(F16=F15,H15,H15-(F16*(H15-H14)/(F16-F15)))
>C17:/FS+C15*C16
>F17:-G13+((C12/H16*(1-((1+(H16/2))^-G11))+(C11/((1+(H16/2))^G11)+H12)
  /((1+(H16/2))^H11)))
>G17:@ABS(F17)
>H17:@IF(F17=F16,H16,H16-(F17*(H16-H15)/(F17-F16)))
>F18:-G13+((C12/H17*(1-((1+(H17/2))^-G11))+(C11/((1+(H17/2))^G11)+H12)
  /((1+(H17/2))^H11)))
>G18:@ABS(F18)
>H18:@IF(F18=F17,H17,H17-(F18*(H17-H16)/(F18-F17)))
>F19:-G13+((C12/H18*(1-((1+(H18/2))^-G11))+(C11/((1+(H18/2))^G11)+H12)
  /((1+(H18/2))^H11)))
>G19:@ABS(F19)
>H19:@IF(F19=F18,H18,H18-(F19*(H18-H17)/(F19-F18)))
>F20:-G13+((C12/H19*(1-((1+(H19/2))^-G11))+(C11/((1+(H19/2))^G11)+H12)
  /((1+(H19/2))^H11)))
>G20:@ABS(F20)
>H20:@IF(F20=F19,H19,H19-(F20*(H19-H18)/(F20-F19)))
>F21:-G13+((C12/H20*(1-((1+(H16/2))^-G11))+(C11/((1+(H20/2))^G11)+H12)
  /((1+(H20/2))^H11)))
>G21:@ABS(F21)
>H21:@IF(F21=F20,H20,H20-(F21*(H20-H19)/(F21-F20)))
>F22:-G13+((C12/H21*(1-((1+(H21/2))^-G11))+(C11/((1+(H21/2))^G11)+H12)
  /((1+(H21/2))^H11)))
>G22:@ABS(F22)
>H22:@IF(F22=F21,H21,H21-(F22*(H21-H20)/(F22-F21)))
>F23:-G13+((C12/H22*(1-((1+(H22/2))^-G11))+(C11/((1+(H22/2))^G11)+H12)
  /((1+(H22/2))^H11)))
>G23:@ABS(F23)
>H23:@IF(F23=F22,H22,H22-(F23*(H22-H21)/(F23-F22)))
>G24:@MIN(G14...G23)
>H24:@IF(G23=G24,H23,@IF(G22=G24,H22,@IF(G21=G24,H21,@IF(G20=G24,H20,@
  IF(G19=G24,H19,@IF(G18=G24,H18,@IF(G17=G24,H17,H16)
>C25:/FS@IF(C12=0,((C11/C13)^(365/(2*E11))-1)*200,@IF(C13=C11,C12/10,1
  00*H24))
>C26:/FS@IF(C13=C11,C13,((C12/(C25/100)*(1-((1+(C25/200))^-G11))+(C11/
  ((1+(C25/200))^G11)+H12)/((1+(C25/200))^H11))-(H12*(1-H11)))
>C29:/FS@IF(C12=0,((C11/C13)^(365/E11)-1)*100,@NA)
```

Figure 2. BondYTM's formula listing.

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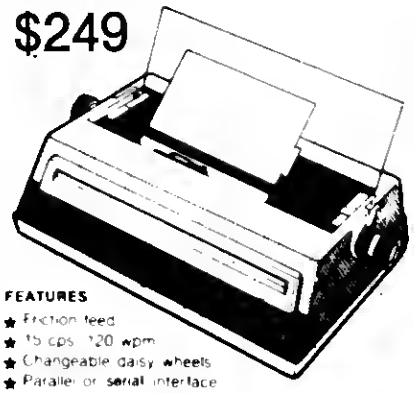

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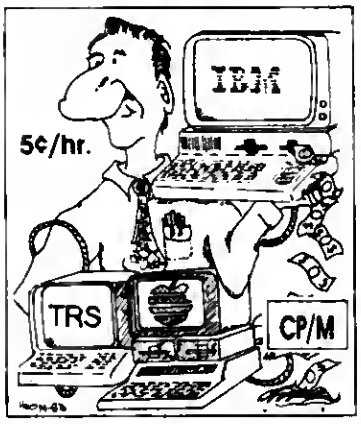

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Tidbit #26

Self-modifying Basic code can be an effective way to store updated variables in a program for use the next time you run the program. Some Basic programs use a sequential series of consecutive numbers over a long time period. For example, an invoice-creation program might start with invoice number 101, then go on to number 102, 103, and so on.

The Program Listing shows how to modify a Basic program so that it continues a numerical series regardless of how often you boot up the program.

Set the starting number as a string variable (N$ in line 110). The program converts that string to a numeric variable using Basic's VAL function. Thereafter, work only with the numeric variable.

The routine in lines 120–150 shows you where you put your program. The modifying technique appears in lines 160–230. Put these lines at the end of your program.

Basic's STR$ function converts the updated number back to a string and the MID$ function removes the leading space (M$ in line 160). The new string is made equal in length to the old one.

Line 170 checks to ensure that the new number isn't too long (as might occur if you went from 999 to 1000).

In lines 190 and 200, Basic's VARPTR function finds the memory locations of the old and new strings.

The key to this technique is in line 210. This routine POKEs each character of the new string into the original string. If you haven't used the original string, Basic still finds it within the Basic program line. By POKEing in new characters, the program changes the string without moving it. If you list the program after running line 210, you'll see that line 110 has changed, with N$ now equal to the new value.

Line 220 saves the modified program to disk. The program is stored with a new starting number in line 110. The next time you run the program, it will have the correct starting number.

One warning for when you first try this technique. Always test it on a spare disk. When POKEing around in Basic, you can easily make a major mistake. Also, this program overwrites the original program, so you should store a back-up copy on another disk.

Andy Levinson
Studio City, CA

```
100 'Demonstration of Self-Modifying Basic Code - Andy Levinson
110 N$="101":N=VAL(N$)                          'Starting Number
120 'Main routine goes here.    Process number using N, not N$.
130 N=N+1:PRINT "Next Number is";N   'Bump Count and Display It
140 PRINT "Select:  <N>ext Number or <S>ave Program"      'Menu
150 I$=INKEY$:IF I$="N" THEN 120 ELSE IF I$<>"S" THEN 150 'Pick
160 M$=MID$(STR$(N),2):L=LEN(N$)-LEN(M$)     'Convert to String
170 IF L<0 THEN PRINT "New Number too Large!":STOP  'Error Trap
180 M$=M$+STRING$(L,32)                       'Pad out with spaces
190 X!=VARPTR(N$):GOSUB 230:N1!=X!          'Find memory location
200 X!=VARPTR(M$):GOSUB 230:N2!=X!          'of Old & New Numbers
210 FOR X=0 TO LEN(N$)-1:POKE N1!+X,PEEK(N2!+X):NEXT X  'Change
220 SAVE "DEMO/BAS":END                   'Save program and finish
230 X!=PEEK(X!+1)+256*PEEK(X!+2):X!=X!+(X!>32767)*65536: RETURN
```

Continued from p. 36

ments, and so on). It highlights relevant dates when it displays the calendar.

You use the calculator as you would any other calculator. Your current number appears at the top of the window, and the mathematical operands appear in the lower part of the window. The calculator does offer one nonstandard feature, the Auto key. When you press the A key just before closing the calculator window, the results of calculations you made appear on your current screen at the cursor location. You could, for example, insert a calculated value in a letter or annual report.

The index card window lets you enter text on an electronic 3- by 5-inch card. The same editing features available with Notepad are available here. Monte's Window organizes the index cards by subject line and lets you write up to eight lines of text for each one.

You move forward or backward through the cards in the file with the arrow keys, and you can copy the selected card to the note pad for printing or editing.

Index Cards' most powerful feature is the context search capability. You can enter a partial or complete text pattern as a search argument without regard to case.

Monte's Window supports CP/M system commands, too. From within the window, you can easily display the directory of any disk drive, the amount of free space on a drive, change the current default drive, and erase files.

With the CP/M window, you can also change the current user area any time. This is vital if you have a hard disk system with many user partitions, which is the only way CP/M segregates files (similar to MS-DOS's subdirectories).

And More

Monte's Window offers some clever features that Montezuma Micro doesn't advertise. For example, you've probably encountered CP/M's dreaded R/O error on a disk or file, forcing you to hit control-C to exit a program, thereby losing your files. Monte's Window won't accept this command, and it intercepts control-C's warm boot and tries to return you to the running program.

In addition, you can implement Monte's Window without using the shift keys; you just invoke the program through a system call to address 0040H (in the reserved CP/M area).

Conclusion

Monte's Window performs well. After the novelty of calling windows and using concurrent applications wears off, you'll find so many uses for the collection of programs that you won't know how you did without them.■

Major Math For Math Majors

by Thomas L. Quindry

★★★

The Math Master Series runs on the Model III and requires one disk drive. PAB Software Inc., P.O. Box 15397, Fort Wayne, IN 46885, 219-485-6980. Various math modules $24.95 to $39.95 each.

Easy to use: ★★★☆☆
Good docs: ★☆☆☆☆
Bug free: ★★☆☆☆
Does the job: ★★★★☆

The Math Master Series of programs are highly specialized Basic language packages for the engineer, scientist, or math student, that is, the serious math user rather than the average computerist. The programs provide mathematical functions for matrix, polynomial, and vector arithmetic and fast Fourier transforms (FFTs), but they're somewhat awkward to use and the documentation isn't that enlightening.

PAB offers each math module separately, which is advantageous if you need only one module, but adds up to a lot of money if you have to buy them all. The modules perform their routines on matrix or array variables.

Up and Running

To use a particular function, you have to load the module and protect high memory. Next, you load and run the supplied initialization program. Then you run the Basic program containing the calls to the module, which are made through the /CMD statement. For example, to use the Matrix Master single-precision module, the statement CMD MAT A = B + C, sets matrix A equal to the sum of matrixes B and C.

The initialization program is the same for all modules. It sets up a DEFUSR function and calls it by way of the USR function to install the CMD pointer.

If you use more than one math module in a program, you have to use the Math Master executive module, which loads other modules. You can have only one module resident in a program at a time since the modules overlay practically the same memory area. The Math Master executive analyzes the /CMD function and loads the math functions as needed.

The Math Master Series has one major flaw. It provides no error-checking to verify that you've initialized a program: if you try to initialize a module more than once, the computer hangs up. And the series doesn't support Model III TRSDOS's CMD L command to load the modules as needed, because you need to reinitialize.

The Modules

You can use each of the Matrix Master modules (single- or double-precision, scaler, or complex) to execute a series of math functions on a matrix: addition, subtraction, and multiplication; scalar (or complex) addition, subtraction, multiplication or division; transpose; inverse; scalar (or complex) variable assign; matrix assign; identity matrix, determinant; and disk or tape input/output functions.

The command structure is similar for each module and PAB provides an example of solving a simultaneous linear equation using the single-precision Matrix Master. The Matrix Master functions are matrix inverse and matrix multiply.

The single- or double-precision Poly Master modules provide a series of polynomial functions for initialization, math, and general manipulation. These modules perform addition; subtraction; multiplication; division; derivative; integral; assignment; value; greatest common divisor; normalize; scalar addition, subtraction, multiplication, and division; scalar assign; and disk and tape input/output functions. Command structure is similar for each module. The single- or double-precision Poly Root Master modules add the commands, Root and ROOTD, allowing polynomial root computations.

The single- and double-precision and scaled integer fast Fourier transform modules provide analyses using several different qualifiers. The qualifiers are real, inverse, Hanning weighting, magnitude, and phase of the transformed data. You don't have to use a qualifier, however, and you can input and output the arrays to a disk file.

Conclusion

The Math Master Series' documentation runs from only eight to 17 pages for each module. PAB assumes that the user has a working knowledge of matrix and/or fast Fourier transform arithmetic rules and terminology. The instructions are minimal and barely adequate.

This program could be easier to use. It is rather archaic to have to remember the correct memory size to protect each time you use one of the packages.

Though these problems exist, good math packages are hard to find. A highly technical user with specific applications would find these packages useful. Since similar packages are available for the IBM PC and Apple II, it would be easy to transport the Basic programs produced with a minimum of fuss.■

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EXPRESS CHECKOUTS

Pro-Create 4.3

★★★★★

Pro-Create 4.3 runs on the Model 4 (64K) and requires one disk drive. Misosys, P.O. Box 4848, Alexandria, VA 22303. $74.95.

Misosys's biggest change to their new version of Pro-Create is in their implementation of the editor/assembler. Previously, Pro-Create featured only EDAS, its combined editor/assembler; Pro-Create 4.3 not only includes EDAS, it also has stand-alone versions of EDAS's macro assembler and line editor.

In addition, Misosys includes Said in this package, an impressive full-screen text editor that supports many word processor features: insert and overtype, text delete and undelete, block copy and move, and string search and replace. Said also supports macro keys; the ability to edit three files at once on a 128K machine; a help display; a reverse Polish notation calculator for binary, hexadecimal, and decimal values; and customized keyboard mapping with an installation program.

Pro-Create offers enhancements to its original macro assembler, too; eight new expression operators; support for the Intel macros REPT, IRPC, and IRP; three new conditionals for controlling a program's assembly; an include assembler directive; an EXITM pseudo-op for premature exits from macro expansions; an Option pseudo-op altering the assembler switches from within the source code; and an MF switch that instructs the assembler to search the macro table before the opcode table. In addition, the assembler's easier to use than before.

—Mark D. Goodwin

Microsoft Word 2.0

★★★★½

Microsoft Word 2.0 runs on the Models 1000 and 1200 (256K) and requires two disk drives (color graphics recommended). Microsoft Corp., 10700 Northup Way, Bellevue, WA 98009, 206-828-8080. $375 (includes mail merge and spelling checker with 80,000-word dictionary).

Just as a Ferrari shouldn't be your first car or an F-16 your first plane ride, Microsoft Word shouldn't be your first word processor. If you don't know basic word processing operations, like block moves and boldface, you can't appreciate Word for what it is: a first-strike thermonuclear word processor. This ain't no Scripsit. This ain't no HomeWord. This ain't no fooling around.

Word has more power than most users will ever need. Not only can it keep eight windowed documents in memory at once and produce a finished book or magazine page on a laser printer, it makes editing with function keys almost as quick and simple as using a mouse. And with Microsoft's mouse, no other software (Macintosh included) is easier to use.

Word is an ultimate version of the Model 100's cut-and-paste editor. You use the function and arrow keys to cut, reformat, or otherwise manipulate text. The most recently cut text goes to a scrap buffer to be relocated or undeleted at a touch of the Insert key.

It also makes on-screen formatting a gleeful what-if game. A few keystrokes can display your text in centered italics, flush-right small caps, justified double or single underlining, indented boldface, or any combination you can think of.

Not only can Word display all these formats, it lets you specify type fonts, sizes, and different options for individual characters. The multilayered commands for these marvels take some practice, but their structure is logical and there's ample on-screen help.

For printing, Word replaces embedded commands with auxiliary disk files called style sheets. You can print text as a plain, double-spaced draft or as a single-spaced, justified, two-column final copy with footnotes, lowercase Roman-numbered pages, and extra space on inside margins for binding.

Before reviewing the IBM PC edition, I briefly tested the Tandy-packaged Word (version 1.15) for the 1000. I'm sure Tandy has updated to version 2.0 by now, but I'd still recommend the Microsoft package. Not only is it cheaper to buy at discount (advertised as low as $239), but it has drivers for over 50 different printers, instead of only eight or 10 Tandy units.

—Eric Grevstad

The Norton Utilities 3.0

★★★★★

The Norton Utilities 3.0 runs on the Tandy 1000/1200/2000 (128K) or any IBM PC-compatible computer that runs MS-DOS 2.X. The Norton Utilities, 2210 Wilshire Blvd., Santa Monica, CA 90403. $99.95.

If you've ever wished that you hadn't inadvertently erased a file or that you had an easy way to get more information on your disk files, The Norton Utilities can help—and at a bargain-basement price.

On boot-up, The Norton Utilities displays a menu from which you choose the individual utilities of interest. A graphics

display indicates where each file resides on the disk and provides information about the file.

The package's 16 programs perform all sorts of disk magic. One utility, File Find, searches all directories for a given file name. Another (Text Search) searches all disk files for a specific text string. A third, Directory Sort, sorts entries contained in a specified directory by either file name, extension, date, and time or file size, and rewrites the directory, rearranging all entries in the specified order.

The Screen Attributes utility controls the background and foreground colors of your display, along with other screen attributes such as blinking, underlining, and reverse video. The System Information utility returns information about your computer such as the type of computer you're using, the revision level of your operating system, the number of logical disk drives, and the amount of memory in the system.

Without a doubt, the Norton Utilities is worth every penny, and it's easy to use to boot.

—Gary A. Shade

Mod-4 by Jack

★★★½

Mod-4 by Jack. Softcover, 218 pp. Crest Software, 2132 Crestview Drive, Durango, CO 81301. $16.

While the *Model 4 Disk System Owner's Manual* is a good reference, its bloated size can limit its usefulness. *Mod-4 by Jack* puts essentially the same information into a more manageable 6- by 9-inch spiral-bound book. While it's missing some information, it is a good source for day-to-day needs.

Jack's organization is identical to that of the *Disk System Owner's Manual*. But *Mod-4 by Jack* is written in a more readable style than Radio Shack's manual. And the book uses better examples and illustrations to explain TRSDOS and Basic commands. The book also provides ample space for making notes for future reference.

Jack left out a few important facts, however. The book's only reference to the TRSDOS job control language (JCL) states that the JCL is useful and that you should read the manual for more details. Also, there aren't any explanations for the Basic Width statement and logical operators. Like the Radio Shack manual, *Mod-4 by Jack* doesn't provide any machine-language programming information.

Despite its few drawbacks, someone who refers to the manual every day might find *Mod-4 by Jack* more convenient than Radio Shack's oversized opus.

—Mark D. Goodwin

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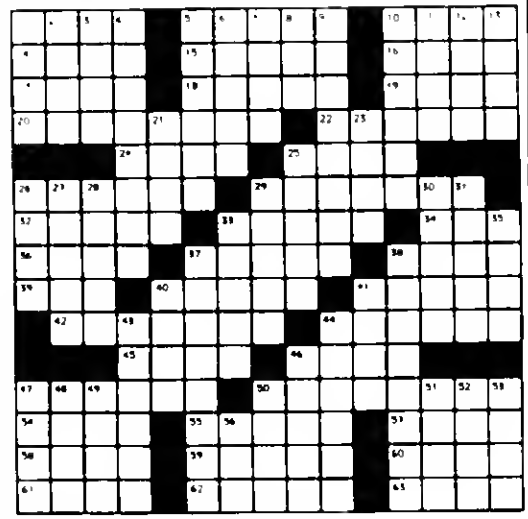
Memories Are Made of This

ACROSS
1 – Tie over, in music
5 – Follows character
10 – Clauses
14 – Video vaster
15 – Endearing word, to Maurice
16 – Home of the Jazz
17 – Rummage sale words
18 – Consumer
19 – _____ shanter (cap)
20 – Mathematical function
22 – Compute arithmetically
24 – Part of a video-game machine
25 – _____ quand (where or when): French
26 – Frequent error message
29 – Hand-crupied
32 – Seventeen, to a computer
33 – Campus orgs.
34 – A class of memory, for short
36 – Run smoothly
37 – Is down
38 – Word for the White Rabbit
39 – Job for a computer
40 – Transmits
41 – Envelopes, in a way
42 – Shopper's burden
44 – Mavericks
45 – Shea Stadium team
46 – Mountain, to a Berliner
47 – Citizen Kane's estate
50 – A Turning Machine?
54 – Are: abbr.
55 – Wake up
57 – Rush-hour component
58 – City on the Truckee
59 – A class of memory, for short
60 – Small weight
61 – Hebrew month
62 – Part of a Mae West line
63 – Tolkien trees

DOWN
1 – Tito was one
2 – A big Apple
3 – Juan, in Madrid
4 – Computer component
5 – Item in granny's kitchen
6 – Part of a Commandment
7 – Head of France?
8 – Former Eng. Soc.
9 – They're in the chips?
10 – Computer production
11 – Chief god of Memphis
12 – Unexciting
13 – Tools of restaurant fame
21 – Four-sevenths of a fronton game?
23 – Charged atoms
25 – Examinations
26 – Small tastes
27 – "I'll look _____ sometime"
28 – Marilyn's real name
29 – Lions' group
30 – Clear
31 – Post office machine
33 – Dracula's string points?
35 – Military dining area
37 – Newspaper specialties
38 – It needs an interpreter
40 – Agenda, for short
41 – Tandy, for one: abbr.
43 – Musical key
44 – The same, in Paris
46 – _____ Inuidies
47 – Part of XL, in shirt sizing
48 – "I gave my love _____, red rose"
49 – Emile Zola novel
50 – Panacea
51 – Twist
52 – State of France?
53 – A class of memories, for short
56 – Unshutter, to Shakespeare



System requirements: 48k—TRS-80* I, III, & IV; IBM* PC or compatible (e.g., Tandy 1000*) Apple*IIs; Commodore*; Atari*

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*Model 3 requires LDOS
Model 4 requires TRSDOS 6.2 or Montezuma Micro CP/M 2.2

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See opposite page ▶▶▶▶▶▶

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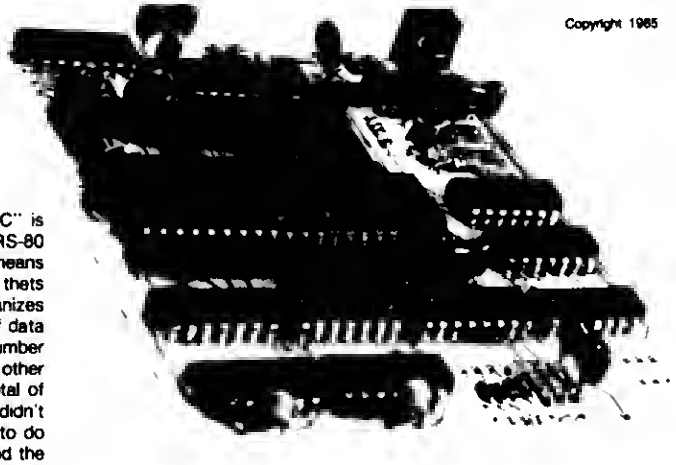
The Story

Some products have what it takes to seem to last forever. Our "ODC" is one of those products. What it does is allow you to operata your TRS-80 Model 1 disk system in double density. In this case double density means almost doubling the storage capacity of your diskattes. Single density, thets the way Redio Shack designed your Model I axpansion interface, organizes your disk into 10 sectors per track. Each sector contains 256 bytes of data for a total storage capacity of 2,560 bytas or 2.5K per track times the number of tracks your drive is capable of adressing. Double density, on the other hand, writes 18 sectors per track each containing 256 bytes for a total of 4,608 bytes or 4.5K. That is 80% mora data in the same space. Why didn't Radio Shack do that in the beginning, you ask? Well it costs money to do double density because it is mora difficult to do than single density and the data is harder to captura reliably. That means mora cost and the Model I was meant to be a low-cost computer for the masses. Therefore, no double density for the original Model I.

The Facts

Other companies introduced double density controllers for the Model I but they wera not so good. Wa waited and waited but, even new models failad to correct problems with data separation thet kapt cropping up. So wa went to work and came up with a new design to cura the old problem. At lest! A double density controller for the Model I with a higher probability of data recovery than with any other double density controller on the market then or since. Our analog design phase lock loop data separator has a wider captura window than the digital types the others use. This allows high resolution data centering. Our "DDC" analog circuit allows infinately variable tuning. The attack and settling times are optimum for 5.25" diskettes. The oft-stated fears of edjustment problems rumored by digital dilettantes have been provad groundless by thousands of satisfied users the world over. The bottom line hera is state-of-the-art performance and reliability.



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Color Me In

Sharp's four-color, high-resolution plotter, the CE-515P ($399), connects to most personal computers that run Basic. Sharp will initially bundle the plotter with Softkey's Keychart software, which provides IBM PC compatibility.

The plotter uses black, blue, green, and red colors that change over automatically. For more information, contact Sharp Electronics Corp., System Division, 10 Sharp Plaza, Paramus, NJ 07652, 201-599-3853.

Circle 567 on Reader Service card.

Changing Around

Gee-Whiz Convert ($99.95) from The Alternate Source converts IBM and IBM-compatible Basic programs to Model 4 Basic. It even handles graphics programs written for the Radio Shack or Grafix Solution high-resolution boards. In addition, Gee-Whiz includes several functions and subroutines that you can incorporate into your new Model 4 programs.

Contact The Alternate Source (704 N. Pennsylvania, Lansing, MI 48906, 517-482-8270) for further information.

Circle 555 on Reader Service card.

Manage Yourself

Little Brother ($99) is a new data management system from Logical Systems Inc. It's available for the Model 4/4P running TRSDOS 6.2 or PC-/MS-DOS 2.0 users.

Little Brother handles up to 65,534 records where each record can contain up to 1,024 bytes. It supports up to 64 different data fields of from 1–254 bytes. Nine different types of data fields are available.

CE-515P, a multifunction plotter from Sharp.

For ease of use every function is menu-driven and on-line help is always available.

Contact Logical Systems Inc., 8970 N. 55th St., P.O. Box 23956, Milwaukee, WI 53223, 414-355-5454 for more details.

Circle 565 on Reader Service card.

Author's Helper

Autoref ($89.95) compiles reference lists of citations made in manuscripts. It works with most word processors and runs on MS-DOS, CP/M-80, and CP/M-86 computers and on the Models I, II, III, 4, 12, and 16.

Autoref automatically finds author citations (in name/date format) in text and alphabetizes them. Then it retrieves a complete reference from a master reference file and builds the document's bibliography. You can create and maintain the master file with Autoref, a word processor, or a data base manager like dBase II or III.

For more information, contact Scilab Inc., P.O. Box 614, Guilderland, NY 12084, 518-355-3363.

Circle 557 on Reader Service card.

Super Data

The Institute for Scientific Analysis Inc. offers a new version of Super, a Xenix-based menu-driven data base management system for the Models 16 and 6000.

Super provides you with simple-to-use data entry, data manipulation, and a report generation system. Automatic record locking lets multiusers access the same data files. The system can handle up to 60 fields and 32,767 records.

The program requires MBasic and sells for $295. For more information, contact ISA, 36 E. Baltimore Pike, Suite 106, Media, PA 19063, 215-566-0801.

Circle 561 on Reader Service card.

Open Windows

SASSE ($75) from En Fleur Corp. is a free-form filing system for the Model III that takes full advantage of its windowing capability.

The program offers a word processor and multitasking features. You can write memos and save them to disk, call the help or operations manual in the midst of an operation, print or sort a file while working on another, and stack seven windows of various information at one time.

Using simple key commands you can edit, write, read, sort, and print any file. SASSE displays each file within its own window and you can scroll them up or down. You can display four record windows within a file at any given time. When you have selected a record you can enlarge the window to show a full view of the text.

You need a 48K, two-disk Model III and TRSDOS to run SASSE. For more details, contact En Fleur Corp., 2494 Sun Valley Circle, Silver Sprtng, MD 20906, 301-598-4532.

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Phonics Fun

K-12 MicroMedia's new phonics program for the Models III and 4, Starting with Phonics, provides more than 1,200 games for practicing phonics with fourth- to sixth-graders. You can use it individually or in small groups. K-12 MicroMedia also offers Winning with Phonics for grades 5–7.

Both packages are $39.95. Contact MicroMedia (172 Broadway, Woodcliff Lake, NJ 07675, 800-922-0401) for more details.

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Assembly Line

Christopher Lampton's *Z80 Assembly-Language Programming for Radio Shack, Timex Sinclair, Adam, and CP/M Computers* presents a tutorial on Assembly language for programmers already familiar with Basic or other high-level languages.

The book is available for

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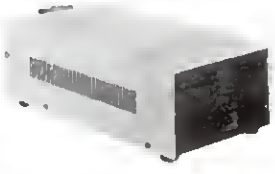

Color Computer Disk Drive
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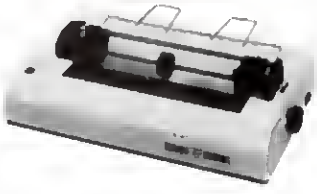

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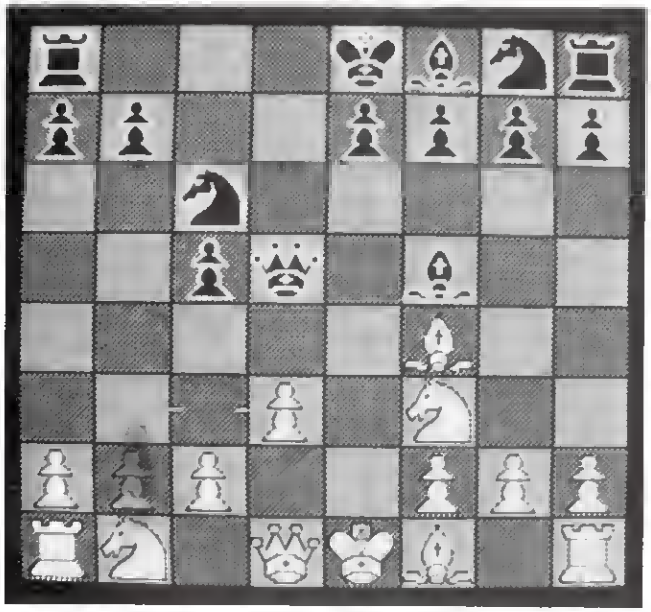

Tournament Chess from Micro-Labs Inc.

$10.90 from Franklin Watts Inc., 387 Park Ave. S., New York, NY 10016, 212-686-7070.

Circle 554 on Reader Service card.

Check Mate

Tournament Chess ($49.95) lets you play chess against a friend or the computer (Models I, III, 4, and 4P). The program uses standard block graphics. If you have a Micro-Labs or Radio Shack high-resolution board installed, the chessboard and pieces are highly detailed.

You can select the following playing levels at any time: Tournament, Rapid Transit, Mate Finder, and Postal. You can cancel a move, turn the board, print out the current board, and save an unfinished game.

Tournament Chess is fast and provides complete game control with over 40 execution options and features. For more details, contact Micro-Labs Inc., 902 Pinecrest, Richardson, TX 75080, 214-235-0915.

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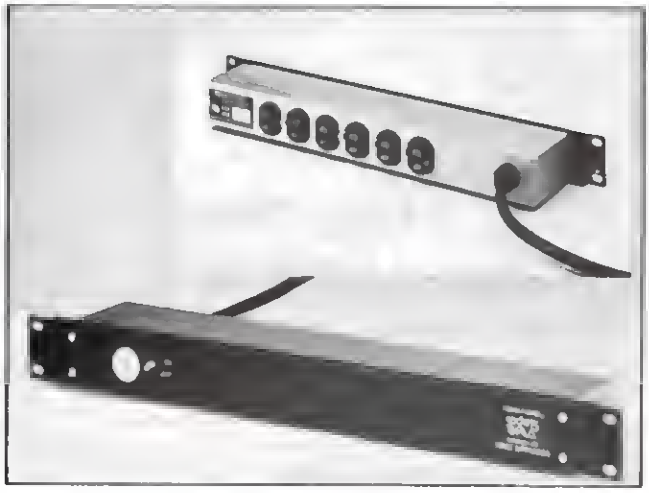

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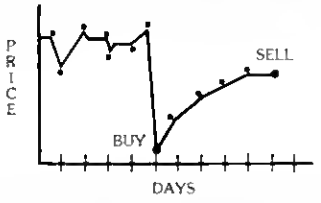

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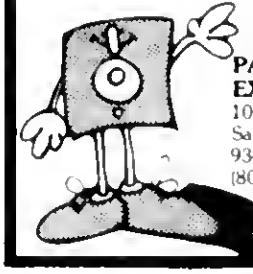

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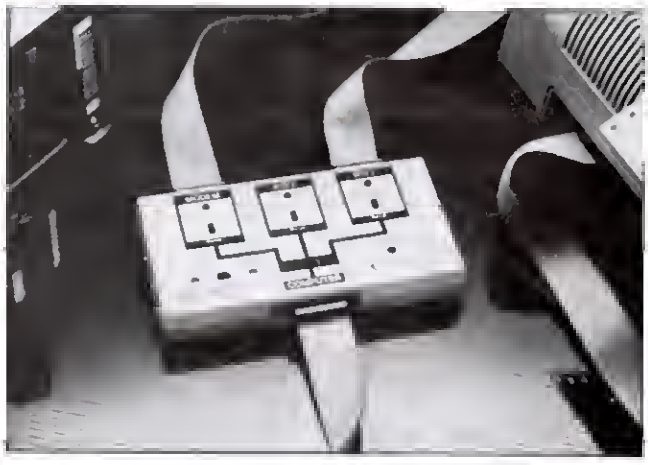

Connect a modem and two printers to your computer with The Smart Switch Box.

mechanism that prevents you from using unprotected equipment in the event of suppression element failure.

Model JT06BO ($63.70) offers single-stage suppression using three metal oxide varistors, while model JS06BO ($92.50) has two-stage filters and uses both metal oxide varistors and silicon avalanche diodes.

For more information, contact Perma Power Electronics, 5615 W. Howard St., Chicago, IL 60648, 312-647-9414.

Circle 560 on Reader Service card.

Back-Up in a Snap

Snapback copies Xenix, TRSDOS, and CP/M data from any Tandy 8.7-, 12-, 15-, and 35-megabyte hard disk to any Model II/12/16/6000 floppy drive at a rate of 1.5 to 2.4 megabytes per minute, without any hardware modifications.

The package includes two bootable disks and documentation. It costs $125 plus $7.50 for handling/shipping. For more information, contact Pickles & Trout, P.O. Box 1206, Goleta, CA 93116, 805-685-4641.

Circle 563 on Reader Service card.

School Days

Scholarships Today (Module I) gives you a list of financial aid programs sponsored by the federal and state government.

You will learn about Pell grants, guaranteed student loans, Plus loans, supplemental educational opportunity grants, college work-study programs, national direct student loans, and sources of state aid.

For each type of financial aid, the exercises cover eligibility criteria, dollar amount available, application procedures, and deadlines. The program also writes custom letters of inquiry and includes a financial aid quiz.

Scholarships Today ($65) runs on the Models III and 4. For more information, contact Jefferson Software, Systems Software Associates Inc., 723 Kanawha Blvd. E., Charleston, West Virginia 25301, 304-342-0769.

Circle 573 on Reader Service card.

Smart Connection

The Smart Switch Box (SSB1000) connects a modem and two peripherals to a single computer. It has one computer port and three peripheral ports (one dedicated to modems).

The Smart Switch Box uses straight-through 25-wire ribbon cables to make the correct RS-232 interconnection between the computer and the peripherals. It also indicates which piece of equipment is disabling data transfer if this type of problem occurs.

The box retails for $159.95. For more information, contact IQ Technologies Inc., 11811 N.E. First St., Suite 308, Bellevue, WA 98005, 206-451-0232.

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The Chipmunk now comes bundled with software.

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Portable Computer Support Group Inc. sells Holmes Engineering's Chipmunk portable disk drive for the Models 100 and 200 bundled with six helpful programs for $599.

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Contact Portable Computer Support Group (11035, Harry Hines Blvd., #207, Dallas, TX 75229, 214-351-0564) for more information.

Circle 569 on Reader Service card.

Security Blanket

Computer Security Institute offers Computer Security Issues and Answers, a 24-page magazine supplement, for free. It contains eight articles that cover planning, computer crime prevention, society's responsibility for data security, legal aspects, software security, and disaster recovery.

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NOTE: MULTIDOS 80/64 does not run TRSDOS 6 programs

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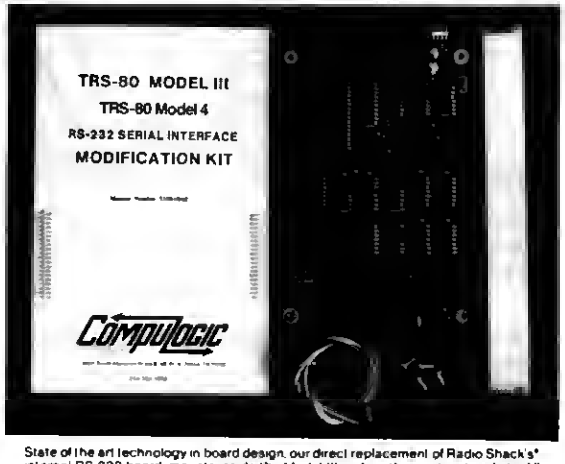
Circle 86 on Reader Service card.

THE RS-232
MODEL III MODEL 4



State of the art technology in board design, our direct replacement of Radio Shack's* internal RS-232 board, mounts inside the Model III or 4 on the existing brackets. All cables, screws and complete mounting instructions are included. Non-technical people will find that installation is quick, straight forward and simple requiring less than 15 minutes to complete.

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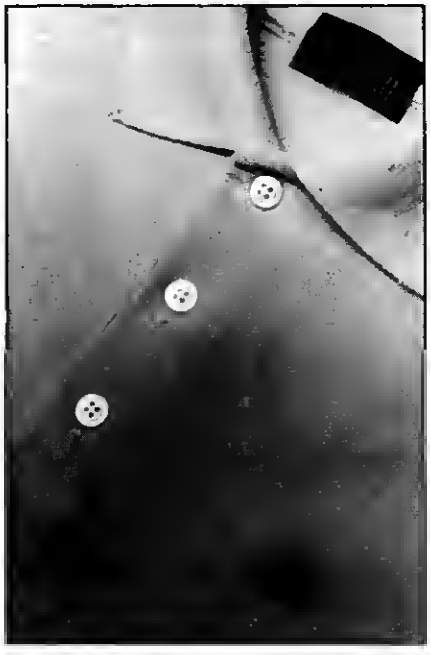
NEW PRODUCTS

DIFFERENT TRACK



High-tech shirt from Sweet Gum Inc.

Wash 'n' Ware

The Tech Shirt ($18.95 plus $1.50 for shipping) is a major breakthrough in software technology. It represents a graphic statement between man and computer.

The pullover shirt is perfect for summer and casual wear. It's available in red and navy blue, in both men's and women's sizes (S, M, L, and XL). The shirts are made of 50 percent cotton and 50 percent polyester.

Contact Sweet Gum Inc. (15490 N.W. 7th Ave., Miami, FL 33169, 800-237-9338) for more information.

Circle 564 on Reader Service card.

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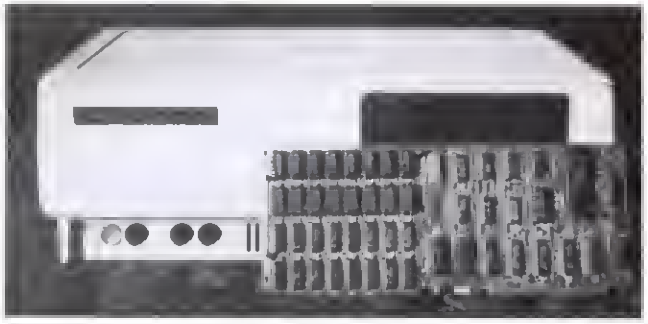
New Products listings are based on information supplied in manufacturers' press releases. 80 Micro has not tested or reviewed these products and cannot guarantee any claims.



The 4N1 card uses one slot on the Model 1000 for four functions.

Memory Lane

Micro Mainframe's multifunction memory card, the 4N1, lets you add up to 512K of additional memory to your Model 1000, thereby giving you the 1000's direct memory access feature, and includes a free RS-232 serial port.

The 4N1 also accepts an optional real-time clock module and/or an optional mouse, giving you four functions while using but a single expansion slot.

The card (with the serial port) comes in four versions: without additional memory ($259.95) and with 128K ($309.95), 256K ($469.95), or 512K ($649.95).

Direct inquiries to Micro Mainframe, 11285-E Sunrise Gold Circle, Rancho Cordova, CA 95670, 916-635-3997.

Circle 556 on Reader Service card.

Super Rescue

Powersoft Products, makers of Super Utility Plus, has released an MS-DOS version of their disk utility for the Models 1000, 1200, and 2000.

In addition to restoring lost data, Super Utility provides diagnostic sector checking, sector modification in hexadecimal or ASCII mode, sector to file copying, string searching of files or raw sector data, and more. It supports both color and monochrome monitors.

The price is $89.95. Contact Powersoft Products (17060 Dallas Parkway, Suite 114, Dallas, TX 75248, 214-733-4475) for more information.

Circle 551 on Reader Service card.

Around the World

Software Concepts Inc. puts a 3-D four-color world globe on the screen of the Models 1000, 1200, and 2000 (128K required).

Atlas ($69.95) also provides geographic facts on more than 3,500 cities and displays the current cursor latitude and longitude. On request, it can identify the city closest to the cursor, find distances between cities, and list facts on population, currency, languages, and so on. You can also rotate the globe and zoom in or out.

For more information, contact Software Concepts Inc., 1116 Summer St., Stamford, CT 06905, 203-357-0522.

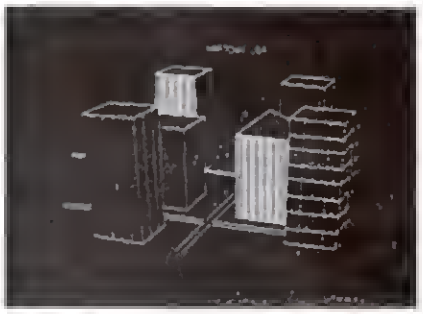
Circle 553 on Reader Service card.

Software Concepts Inc.'s Atlas puts the globe at your fingertips.

Circle 464 on Reader Service card.

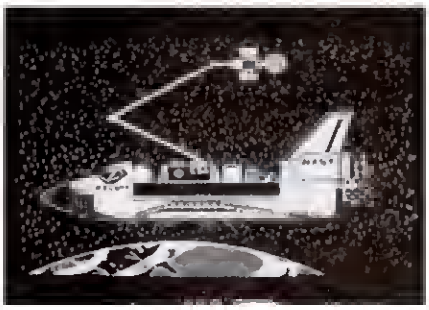
Grafyx Solution™ Save $100.00

High-Resolution Grophics for Mod 4/4P/III



Superior Hardware. The Grafyx Solution provides 153,600 pixel elements which are arranged in a 640 × 240 or on the Model III a 512 × 192 matrix. Hundreds of new business, personal, engineering, and educational applications are now possible. The hi-res display can be shown on top of the standard display containing text, special characters, and block graphics. This simplifies program debugging, text labeling, and upgrading current programs to use graphics. The Grafyx Solution fits completely within any tape or disk based Model 4, 4P, or III. Installation is easy with the plug-in, clip-on board.

Superior Basic. Over 20 commands are added to the Basic language. These commands will set, clear or complement points, lines, boxes, circles, ellipses, or arcs. The hi-res screen can be printed on any of 20 popular printers or saved or loaded to disk without leaving Basic. Areas may be filled in with any of 256 patterns. Sections of the screen may be saved and then put back using any of five logical functions. Labels can be printed in any direction. The viewing area can be changed. The entire screen can be complemented or cleared. Graphics Basic provides dot densities of 640 × 240, 320 × 240, 160 × 240, and 160 × 120, all of which can be used in the same display.



Superior Software. The board comes with over 40 programs and files which make it easier to use, serve as practical applications, demonstrate its capabilities, and serve as programming examples. The software works with TRSDOS 1.3, 6.1.2, 6.2, LDOS, NEWDOS80, and DOSPLUS. The Grafyx Solution is also supported by a number of optional applications programs: Draw, Bizgraph, xT.CAD, 3D-Plot, Mathplot, Surface Plot, Biorhythm & U5A, Music.

The Grafyx Solution package is shipped complete for $199.95 (reduced from $299.95). A manual for review is $15. Payment may be by check, Visa/MC, or COD. Domestic shipping is free on pre-paid orders. Texas residents add 5½% tax.

MICRO-LABS, INC. 214-235-0915
902 Pinecrest, Richardson, Texas 75080

Account on It

Dac Software Inc. offers Dac-Easy, seven accounting modules (general ledger, accounts receivable, accounts payable, inventory, purchase order, billing, and forecasting) on one Model 1000, 1200, or 2000 MS-DOS disk for $49.95.

Among the program's special features are automatic forecasting without a spreadsheet, keeping up to three years of history, multilevel accounting, and flexible report formats. For more information, contact Dac Software Inc., 1550 Peterson, Suite 130, Dallas, TX 75240, 214-458-0038.

Circle 566 on Reader Service card.

Music for Your Computer

Quartet ($399.95) is an integrated, menu-driven accounting system for the Models 1000, 1200, and 2000. The user interface makes this package special. When you enter payroll data, the screen displays a time-card. You pay bills by filling in on-screen check forms, and you fill in accounts receivable on a screen invoice. In addition, the package provides a general ledger program.

You need two disk drives and 256K to run Quartet. For more information, contact Tandy Corp./Radio Shack, 1800 One Tandy Center, Fort Worth, TX 76102.

Circle 562 on Reader Service card.

Dac-Easy, an accounting package for the Models 1000, 1200 and 2000.

Seven in One

The Ultimate ($149.95) is an integrated package of seven Model 1000, 1200, or 2000 applications: word processing, data base manager, mail merger, dictionary, sort, electronic mail, and Western Union Easy Link. All the programs work together.

The package requires 96K RAM, one 360K disk drive, a parallel printer, a modem, and a monochrome monitor. It's available at Radio Shack stores.

For additional information, contact Computer Creations Inc., 6861 Convoy Court, San Diego, CA 92111, 619-277-8822.

Circle 568 on Reader Service card.

A Mystical Adventure

Icon ($49.95) is a new color graphics adventure game from Macrocom for the IBM PCs and PC-compatibles, including the 128K Models 1000 and 1200. In the quest for the ring you journey through dungeons in search of mystic icons. You have to fight vampire bats, fierce kobolds, ghosts, and other monsters.

For more information, contact Macrocom Inc., P.O. Box 70012, Marietta, GA 30007, 800-622-8086.

Circle 552 on Reader Service card.

Circle 227 on Reader Service card.

NEW And IMPROVED CP/M-68K

Treat your TRS-80 Model-16 or Enhanced Model-II or -12 to our new Version 1.2 CP/M-68K, now with:

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Austin, Texas 78751
(512) 453-2233

*Requires 256 kbytes minimum except for BASIC-68K.

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Magic Menu comes between you and MS-DOS.

MS-DOS New Products Index

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New Products listings are based on information supplied in manufacturers' press releases. 80 Micro has not tested or reviewed these products and cannot guarantee any claims.

Menu, Menu On the Wall

Magic Menu ($99) is a menu system that lets you select and execute over 1,000 applications programs with a few keystrokes, without dealing with MS-DOS (version 2.0 or later) or consulting a manual.

The system interfaces between you and the DOS so you can call any application. Sequence screens let you automatically execute a series of menu entries, and password security is available for all applications.

Magic Menu can be made memory resident so you can use it on systems without a fixed disk. You can select the presentation format for each menu screen in the system. Presentation format choices include black and white or color screen, foreground, background, and border colors, date/time display, and menu character size.

Magic Menu works with 128K on the Models 1000 and 1200HD. For more information, contact DeereSoft Inc., P.O. Box 1360, Melbourne, FL 32901, 305-768-2477.

Circle 574 on Reader Service card.

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Wholesale Computer Paper •You'll appreciate the savings • FREE Catalog Progressive Programming P.O. Box 98 Grove City, OH 43123.

Dollar Diskettes! DS/DD w/Hub ring. Dollar Brand are available in packs of 10 for $10.00. Add $2.00 postage and handling to total order. No minimum no maximum lifetime guarantee. 4831 S. Hampton, LB-41 Dallas, TX 75232.

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PUBLICATIONS

Close-out Sale! TRS-80 Encyclopedia by Wayne Green Inc. 10 volume hardcover was $199.50 now $79.99. 10 volume softcover was $109.50 now $58.99. Mail to DiskCount Data see page 31 for address.

The Kepner Letter, from the author of Feedback Loop and Campbell Communications. Has the most timely Hardware, Software and book news for the TRS-80 Computers. Special Offer. Call (603) 924-9450 for information, or write to 145 Grove St. Peterborough, NH 03458.

Circle **549** on Reader Service Card

SOFTWARE

Coin Collectors! Unique program uses built-in market value file and prices your U.S. collection. Brochure available. Compu-Quote 8914 Berquist, Catnoga Park, CA 91307 (818) 348-3662.

HARDWARE

Modular I/O Port Kits. Parallel 8 bit input & output. Models I, III, 4 and CoCo. Modular design for addition of multiple ports. J107K complete I/O port kit $35 D100K 5 volt power supply $25 J202K A-D/D-A Interface $35 J105K Buffer Board Kit $25 J112K Model III/4 Adaptor $20 J110K CoCo Adaptor $15 D&A Research, 400 Wilson Ave. Satellite Beach, FL 32937. 305-777-1728

Services Rendered: Tandy's Warranty Policy

Send your questions dealing specifically with Tandy products, services, or policies to Ask Tandy, 80 Micro, 80 Pine St., Peterborough, NH 03458. A representative at Tandy's Fort Worth, TX, headquarters supplies all answers published here.

Q: I'm in the market for a Tandy 1000. Some companies advertise Tandy products at discounts, but I hear that Tandy might not service products bought by mail order. What's the real story?

A: *Our standard warranty covers any Tandy product as long as you're the original owner and you bought it from a Radio Shack Computer Center, store, or authorized dealer. Your original sales slip is the vehicle by which you get warranty service; nothing else is valid. Making a purchase by mail doesn't affect the warranty. My suggestion, however, is always to deal with your local outlet, on which you'll lean for support. We require Radio Shack company-owned stores to provide service and support in a timely manner for all products bought through any authorized channel.*

Q: I've read that the Tandy 2000's MS-Assembler doesn't support two Intel 80186 instructions, PUSHA and POPA. Why?

A: *The assembler's manufacturer, Microsoft, didn't support those commands. Tandy didn't push for them, in order to insure some software compatibility between the 2000 and our 8088-based computers, the Tandy 1200 HD and 1000. I'm told Microsoft has a new assembler that does support those instructions, but I don't know when it will become available. Also, we haven't decided if you'll see it as a Tandy product.*

Q: Will Tandy transfer Model III disk-based software to Model I format if a customer requests it?

A: *When a Model III program worked reasonably well on the Model I, Tandy usually made it available for the I. However, some Model III programs just wouldn't run in the amount of disk space available on a Model I.*

You could always transfer a program from a III to a I via an RS-232 port. But if we didn't offer the program for the I, it's likely you wouldn't be pleased with the results. And no, we don't offer a conversion service.

Q: SuperScripsit has a problem: When one document contains multiple line spacings, it prints out correctly, but the line number on the status line is wrong. Will you fix it?

A: *On investigation, we found that the problem could be solved, but at the cost of slowing SuperScripsit's overall operation significantly. Our merchandising people decided to leave the current version as-is. If and when we do a major rewrite of SuperScripsit, fixing that problem is definitely on our wish list.*

Q: I need help with a serious Tandy 1000 problem. With a monochrome monitor, when MS-DOS boots up, the display's intensity is inadequate, even with the brightness control set to maximum. I know MS-DOS's Mode CO command, or Basic's SCREEN 0,1 will improve it, but what do I do when running IBM PC software?

A: *You're right about the problem. Two possibilities. First, we can do a hardware modification; check with your local repair facility. Second, as you boot up, press the F12 key when the buzzer sounds. That makes the computer think you're using a color monitor, forcing a higher intensity configuration at the monochrome port.*

Q: I bought a pretty complete Tandy 1000 system. After receiving the hard disk drive board I ordered, I'm upset to find that it works only with a secondary hard disk drive and not with the 15-megabyte primary drive I already have. Nobody told me this. What am I supposed to do now?

A: *The difference between a primary and a secondary 15-megabyte hard disk drive is that the former contains a controller board; the latter doesn't. On the Tandy 1000, the board you bought is the controller. It should be easy to convert your primary drive to a secondary one. All it takes is disconnecting the controller card; also, you'll need some cables. It does mean you have a pretty expensive controller board sitting unused, but at least you won't have to buy another drive.*

Q: I have a DWP-210 printer, and would like to get colored printer ribbons: blue, brown, and so forth. But I can't find them anywhere. Why? Not to be able to order a $6 ribbon is almost ridiculous.

A: *While we realize some customers would kill for ribbons of a particular color, we've found the demand isn't enough to justify our producing them. The DWP-210 ribbon is a standard Diablo Hy-Type II ribbon. The ribbons you want should be easy to find in distribution.*

Q: I completely disagree with your response on sending out customer support letters to registered TRS-80 owners (February 1985, p. 144). I've been a registered owner of a Model I, and I have yet to receive one word about it.

A: *That's probably because we haven't sent out anything. The program started long after Tandy discontinued the Model I. It's a software registration program. The only Model I package for which we mailed a notice was the Model I/III version of SuperScripsit. We contact owners only when we have a software update notice.*

Q: Will Tandy be coming out with a 128K upgrade for the Color Computer?

A: *No.*

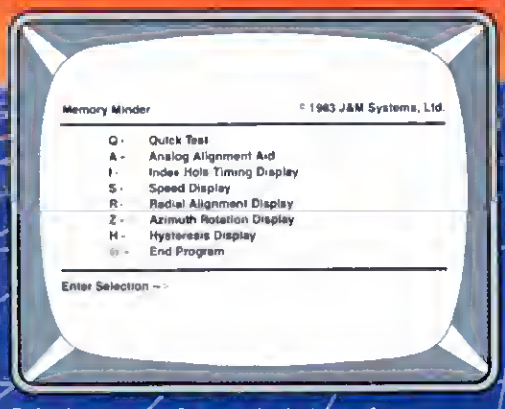
A couple of notes: In the June 1985 issue, I answered a question about getting replacements for lost software manuals. I said they were available on a case-by-case basis. Wrong. Tandy's policy changed about a year ago. Replacement software manuals aren't available under any circumstances. We've joined other industry leaders like Microsoft and Lotus in an attempt to discourage software piracy. Sorry for misleading you.

Also, I've gotten several questions about products that are available for more than one Tandy computer. When you write with a question, please specify what computer you own. ■

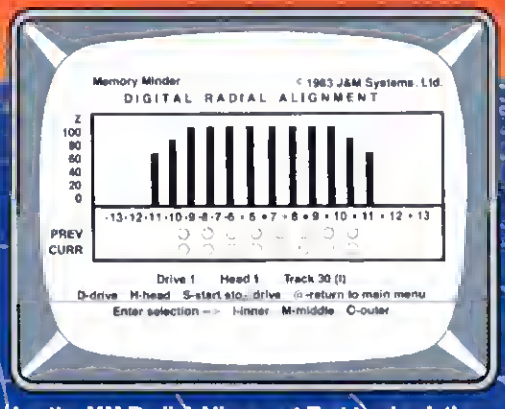
Circle 101 on Reader Service card.

MEMORY MINDER™

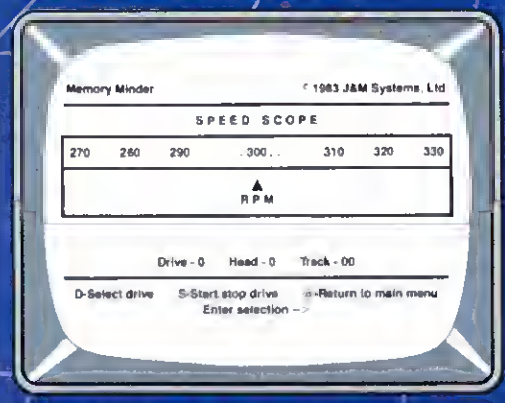
. . . A UNIQUE APPROACH TO DISK RELIABILITY!



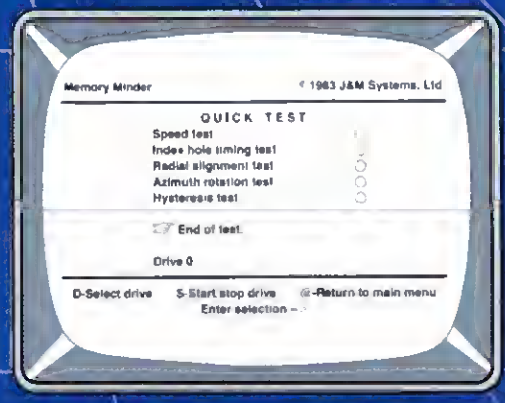
Select any one of seven tests to perform preventive maintenance or to isolate problems. Simple, single-letter commands make MM easy to use! Use MM to align the head, adjust the index hole detector, or adjust the speed.



Use the MM Radial Alignment Test to check the head alignment of your drives. No need for an oscilloscope or other expensive test equipment!



Check the motor speed of your drives. Or, you can even use the Speed Test to adjust the drive speed. No need for any test equipment!



Use the Quick Test to quickly and automatically test five of the most important performance parameters of your drive. Monitor your drives for long term drift. Isolate problems quickly and automatically!

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Now you can make sure your data is being recorded properly by the use of the revolutionary ***Memory Minder.***

The Memory Minder from J & M Systems, tests your disk's performance and calibration without any additional equipment! It measures your disk's performance and displays it on your screen.

This is the most comprehensive disk diagnostic program available for your TRS-80 microcomputer. You can even adjust drive alignment while watching the display!

Spot problems ***before*** they endanger your data! If you own a disk drive, you ***need*** the ***Memory Minder!***

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Includes 48 tpi & 96 tpi program diskettes	
TRS-80 Model -I	
1 - 48 tpi Single Side Single Density	$89
TRS-80 Color Computer and TDP-100	
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MM also available for other models

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VERSAINVENTORY™ $99.95

VERSAINVENTORY™ is a complete inventory control system that gives you instant access to data on any item. VERSAINVENTORY™ keeps track of all information related to what items are in stock, out of stock, on backorder, etc., stores sales and pricing data, alerts you when an item falls below a preset reorder point, and allows you to enter and print invoices directly or to link with the VERSARECEIVABLES™ system. VERSAINVENTORY™ prints all needed inventory listings, reports of items below reorder point, inventory value reports, period and year to-date sales reports, price lists, inventory checklists, etc.

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VERSALEDGER II™ is a complete accounting system that grows as your business grows. VERSALEDGER II™ can be used as a simple personal checkbook register, expanded to a small business bookkeeping system or developed into a large corporate general ledger system **without any additional software.**

- VERSALEDGER II™ gives you almost unlimited storage capacity (300 to 10,000 entries per month, depending on the system),
- stores all check and general ledger information forever,
- prints tractor-feed checks,
- handles multiple checkbooks and general ledgers,
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VERSALEDGER II™ comes with a professionally-written 160 page manual designed for first-time users. The VERSALEDGER II™ manual will help you become quickly familiar with VERSALEDGER II™, using complete sample data files supplied on diskette and more than 50 pages of sample printouts.

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